INFORMATION SYSTEM ALIGNMENT AND ITS IMPACT ON TECHNOLOGY TRANSFER:

THE CASE OF THE KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH

S H S Y ALOBAIDLY

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INFORMATION SYSTEM ALIGNMENT AND ITS IMPACT ON TECHNOLOGY TRANSFER: THE CASE OF THE KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH

Sulaiman H. S. Y. Alobaidly

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Abstract

Information Systems (IS) alignment is one of the most significant areas of concern in terms of priority for both the Information Technology and the Management fields. In this context, many scientific research organisations face the challenge of integrating their IS with organisational strategic objectives. This research aimed to develop a practical model of IS strategic alignment, that can be adopted by scientific research and development (SR&D) organisations in order to improve technology transfer activities. The research involved a single exploratory case study of an SR&D organisation in Kuwait, the Kuwait Institute for Scientific Research (KISR). Thirty-seven respondents from the research management, IS management, and planning and support groups of KISR, namely, the scientific research senior managers, IS senior managers, and consultants, respectively, were interviewed concerning issues related to the organisational, strategic, and IS domains. Semi-structured interviews have been designed as a data collection method. The study has utilised certain data analysis techniques including template analysis, coding and classification, and interpretive analysis methods. In the analysis of the external and internal contexts, briefly, Kuwait's IT plan was discussed, along with the challenges, and in detail, the description and analysis of KISR's strategic plans. Twenty-two factors were identified and have emerged in this study which have effects on IS alignment. The key contributions, including a critical and comprehensive survey of IS strategy literature has led to the identification of factors that may affect IS alignment. A conceptual

framework was designed to enable a better insight of the IS alignment challenges. A practical road map was developed in this study to guide and direct SR&D organisations in achieving IS alignment effectively and efficiently. This road map is aimed at bridging the gap between theory and practice for organisations. The proposed practical road map will help KISR and other SR&D organisations to achieve both successful and feasible IS strategic alignment to enable effective technology and knowledge transfer.

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Glossary

AFSS	Administration, Finance and Support Services Sector
AGC	Arabian Gulf Countries
AR	Applied Research
CCP	The Contextualist Approach and Context, Content and Process
CCSC	Centre for Corporate Strategy and Change
CEO	Chief Executive Officer
CIO	Chief Information Officer
CRM	Customer Relationship Management
CSF	Critical Success Factors
CSO	Chief Strategic Officer
CTCD	Computer Technology and Communication Department
DGC	Director General's Council
EBRC	Energy and Building Research Centre
ELSRC	Environment and Life Sciences Research
EPA	Environment Public Authority
ERP	Enterprise resources Planning
GCC	Gulf Cooperating Council
GDP	Gross Domestic Product
GESD	Gulf Electronic Scientific Database
GTM	Grounded Theory Method
HR	Human Resources
ICBMEF	International Conference on Business, Management, Economic and Finance
ICT	Information Communication Technology
IM	Information Management

IS	Information System
ISP	Information System Planning
ISSN	International Standard Serial Number
IT	Information Technology
ITR	Information Technology Research
KACST	King Abdulaziz City for Science and Technology
KDR	Kuwait Digital Repository
KFAS	Kuwait Foundation for advancement of Science
KIEIN	Kuwait Integration Environmental Information Network
KISR	Kuwait Institute for Scientific Research
KNCSER	Kuwait National Consortium of Scientific Electronic Research
KNPC	Kuwait National Petroleum Company
KOC	Kuwait Oil Company
KPC	Kuwait Petroleum Company
KSA	Kingdom of Saudi Arabia
KU	Kuwait University
MIS	Management Information Systems
MOE	Ministry of Education
MOH	Ministry of Health
NCED	National Centre for Education Development
NNSSK	National Nutrition Survey for the State of Kuwait
NSTIC	The National Scientific and Technology Information Centre
OFF	Organizational Fit Framework
PAAET	Public Authority for Applied Education and Training
PAAFR	Public Authority for Agriculture and Fisheries Resources
PMI	Project Management Institute
PMIS	Project Management Information System

PMO	Project Management Office
PO	Planning Office
PRC	Petroleum Research Centre
Prince2	Project Controlled Environments
PRM	Project Review Meeting
PS	Program Supervisor
QSTP	Qatar Science and Technology Park
R&D	Research and Development
RC	Resource Coordinator
RedSOFT	Regional Centre for the Development of Education Software
SAM	Strategic Alignment Model
SBU	Strategic Business Unit
SDD	Systems Development Department
SIS	Strategic Information System
SISP	Strategic Information System Planning
SITS	The Strategic Information Technology Services System
SR&D	Scientific Research and Development
STD	Science and Technology Department
STI	Science and Technology Innovation
STPP	Science and Technology Publication Program
SWOT	The analysis of Strength, Weaknesses, Opportunities and Threats
TDS	Technology Development and Services
WRC	Water Research Centre

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Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas, and contributions from the work of others. The content of the thesis is the result of my own original work carried out at the Institute for Scientific Research in the State of Kuwait.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the University Ethics Committee.

I declare that the word count of this Thesis is 78296 words

Name: Sulaiman Alobaidly

Signature:

Date: 2nd may 2017

Chapter 1: Introduction

1.1 Research Background

Information Technology (IT) has been considered a key competitive driver for most organisations over the past decade. The role of IT in organisations has become a fundamental part of the dynamic business environment. The strategic use of IT for effective business performance in contributing to the creation of business value has been a proven and well-recognised subject of study (Luftman et al., 1993; Earl, 1997; Silvius, 2007; Pedraza et al., 2011). The alignment between Information System (IS) and strategic planning is one of the most significant areas of concerns on the priority list of business in terms of IT issues, as well as the management field (Ward and Peppard, 2002, Aversano et al., 2016). IS alignment has persisted as one of the top concerns for IT managers for almost 30 years, and of first or second importance in the last eight years (Luftman and Ben-Zvi, 2010a). A survey, conducted by Chief Information Officer (CIO) Insight, showed that the number one CIO priority for 2008 was "Improve Alignment with Business Objectives" (Alter, 2007). IS Alignment was one of the top 10 issues identified in a survey of CIOs in 1983, 1986, 1994, and 2008. Moreover, CIO Magazine published its State of the CIO 2011 survey results and listed "Aligning IT and Business Goals" as the number one CIO priority **(**CIO magazine, 2011). Recently, the 2015 CIO survey found that CIOs have not been involved in determining the organisational strategy of the firm which therefore exacerbates the

problem of IT and business strategic alignment. The survey results stated that the IS alignment "could be in part due to the historic lack of communication among these executives representing different business and organisational functions. But this is all changing. CEOs know where they want to go, know that CIOs can get them there technically, and that Chief Strategy Officers (CSOs) can protect them along the way. By giving CSOs and Chief Information Officers (CIOs) a seat in the boardroom, a proper road map can be put in place so that the most efficient technology will be used to drive business results" (CIO magazine, 2015).

IS alignment studies in the early stages were focused on the failure to consider the value of investing in IT. It has been treated for a long time as a "Cost Centre" or an expense, rather than a strategic weapon (Alter, 1995). Since the 1980s, this role has been recognized as "strategic", and it has been regarded as an enabler to achieve competitive advantage (IBM, 1981, Porter, 1985, Earl, 1989b, Galliers and Sutherland, 1991, Henderson and Venkatraman, 1993, Coleman and Papp, 2006, Johnson and Lederer, 2010).

However, recent studies showed that organisations are struggling to address alignment challenges (Chan and Reich, 2007b, Silvius, 2009, Levy et al., 2011). Despite contributions made to the field from different perspectives, IS alignment remains to be difficult to achieve (Gutierrez, 2011). Chan and Reich (2007b) found that many scholars argued that alignment literature fails to identify the possible solutions to integrate IS with business; one of the main reasons for this failure is the theoretical nature of alignment research.

Preston (2014) argued that the existing literature indicates that IS alignment has not been clearly researched, particularly the practicalities of its achievement. The literature provides little guidance on how to achieve alignment between business and IT strategies, and what management can do to diagnose, achieve, and maintain alignment (Coltman et al., 2015). Organisations have to determine and understand how to manage IT strategically in order to stay competitive in a dynamic business environment (Henderson and Venkatraman, 1993, Earl, 1997, Kyobe, 2008, Grant et al., 2010, Pedraza et al., 2011).

This research examines IS alignment and its impact on a scientific research organization. It is focused particularly on the development of a framework to manage IS/IT alignment to achieve organisational efficiency and effectiveness and in this case, enable a scientific organisation to effect knowledge transfer.

1.2 The Research Problem and Questions

The IS alignment literature is by now substantial and diverse (Almahamid, 2005). Dhugga and Addison (2011) contended that:

> *"Organisations that deploy techniques to achieve stronger engagement with the strategic technology agenda are substantially more successful in delivering against their corporate goals" (p.7).*

Furthermore, IS alignment could improve the organisational ability to realize the vision and goals; provide more agility in response to organisational diversification, growth, and development; improve ability to deliver products or services at lower cost; enhance rapid response to the dynamic and volatile business environment; create new products or services; penetrate more deeply into a specific market segment; improve the quality of managerial decision making; increase operational efficiency and productivity; facilitate effective utilisation of IT resources to support a firm's operations; produce competitive advantage; and increase IT value (Dhugga and Addison, 2011, Burn and Szeto, 2000).

Notwithstanding, most of the IS alignment research is theoretical and demonstrates a lack of practicalities in terms of its achievement. Luftman and Brier (1999) noted that:

> *"Several frameworks have been proposed to assess the strategic issues regarding the role of IT as a competitive weapon. They have not, however, yielded empirical evidence, nor have they provided a road map to carry out alignment" (p.110).*

Furthermore, Avison et al. (2004) stated that:

> *"In contrast to some other areas of IS research, there is debate in the literature about what alignment actually is, why it is needed, how firms may go about the task of becoming aligned, and how it should best be researched. While there is little agreement on conceptualising alignment and its research basis, the literature does regularly lament the paucity of studies that*

> *assess how organisations carry out alignment in practice" (p.224).*

King and Teo (2000) affirmed that:

> *"Despite the importance of Information Systems Planning (ISP) modes, research in this area is still primarily conceptual in nature. Empirical research focusing on Business Planning (BP) and ISP integration is relatively sparse" (p.667).*

Chan and Reich (2007b) summarised alignment challenges relating to a practitioner's perspective as follows:

- The challenges related to alignment knowledge
- The strategy of the organisation is unknown.
- The absence of considering the importance of the role of alignment
- The challenges related to business knowledge
- The challenges related to control and management of IT
- The challenges related to organisational change.

The existence of an IS plan does not necessarily mean, that there is a level of integration between IS and business strategy. Furthermore, the integration of an IS plan with part or a level of a business plan is not enough; alignment must be pursued at all parts and levels of the organisation (Chan and Reich, 2007b, Benbya and McKelvey, 2006). Due to the changing nature of the business environment IS alignment should be dynamic and is an ongoing process. Moreover, the evolutionary

nature of many strategic plans makes achieving IS alignment more complex and difficult, due to the fact that strategic plans are not static; they should be flexible to deal with the challenges and emerging changes in the business environment (Reynolds and Yetton, 2015). Also, not all of the strategic processes are formal including even written plans (Gutierrez, 2011).

This PhD research therefore proposes to address the following questions:

- What are the key determinants of success for aligning IS strategy with organisational strategy?
- How can Scientific Research and Development (SR&D) organisations develop a deeper understanding of how to achieve IS and organisational alignment?
- How can SR&D organisations develop a framework for, and ensure the achievement of, sustainable IS and organisational alignment?

Therefore, there is a need to address the aforementioned questions in order to provide a better understanding of IS alignment. The answers to these questions will lead to the development of an alignment strategy model not only for the case of the Kuwait Institute for Scientific Research (KISR), but also for other government SR&D organisations of the same nature.

1.3 Research Aims and Objectives

This research aims to develop a practical model of IS and organisational alignment, that can be applied by SR&D organisations in order to improve technology transfer activities. To achieve the research aim, specific objectives were formulated as follows:

- to identify and categorise the key determinants of success, that would allow SR&D organisations to align IS strategy with organisational strategy.
- to explore and understand the process of IS and organisational alignment using a case study organisation
- to develop an IS alignment framework that can be applied to the case of KISR and other SR&D organisations
- to develop an IS alignment road map for use by SR&D organisations
- to provide specific recommendations toward improving and executing the IS alignment road map in SR&D organisations.

1.4 Brief Summary of Research Methodology

Based on the aims of the research, and the context and culture of the case study organisation, it was considered that a qualitative approach falling within the interpretivist paradigm would provide the best results.

Building a theory from an exploratory single case study has been chosen as a methodology for the research. Moreover, developing theories from a single case study approach has been adopted as the design frame for the research. Yin's approach (2009) will be combined with other methods adopted from Walsham (2001) ; Chetty (1996); Edwards (1998); Rossi and Freeman (1993); and Eisenhardt (1989). Table 1-1 summarises the research methodology.

Table 1-1: Description of the methodology adopted from Crotty (1998)

Theoretical Perspective	Methodology	Methods
• **Interpretivism Paradigm** • **Qualitative inductive approach**	• Exploratory single-case Study	• Documents analysis • Interviews • Template analysis

Semi-structured interviews have been designed and used as a data collection method. The study has utilised selected data analysis techniques including template analysis, thematic coding, and classification.

1.5 Contributions to Knowledge

There is a dearth of information or knowledge pertaining to the implementation of successful integration between IS and organisation strategies, particularly in the public and government sectors. Moreover, no study has yet identified the requirements for achieving, maintaining, and diagnosing challenges that hinder sustainable alignment in the governmental SR&D organisations; as for as I know. Hence, this research is an attempt to explore and understand IS alignment in SR&D organisations, as well as identifying and categorising critical success factors of IS alignment. Previous studies have explored success factors, but this research tried to go a step further by categorising the critical factors and key determinants of successful alignment and by proposing a generic framework that investigates an organisation's alignment maturity at a more in-depth level. Given that SR&D organisations are beset with weaknesses in terms of extracting value from their IT systems to support the core knowledge transfer processes and activities, the proposed framework could be used as a working model, hopefully, to present solutions to strengthen their IS and organisational alignment. The contributions to knowledge are based on both theoretical and practical research perspectives.

1.5.1 From a Theoretical Perspective

A review of the literature has shown that while a majority of the current studies on IS alignment have been conducted in well-developed and westernised countries; only a

minority of studies have been undertaken in recent years in developing countries, especially in the Middle East. Neither has there been any study comparing the literature in developed and developing countries; to the best of my knowledge. Therefore, this research is an effort to provide some insights and knowledge on the alignment between IS and organisational strategy in the context of Kuwait as a developing country. In this regard, some Middle East countries have established SR&D centres to promote scientific and applied research, particularly in matters related to industry, environment, food resources, and other primary constituents of the national economy, in an endeavour to serve the goals of economic, technological, and scientific development, and to advise the government on scientific matters and scientific policy issues. For example, Arabian Gulf Countries (AGCs) as a part of the Middle East region have set up several centres for this purpose such as KISR, the King Abdulaziz City for Science and Technology (KACST) in the Kingdom of Saudi Arabia (KSA), and the Qatar Science & Technology Park (QSTP), among others. The main objective of these organisations is to conduct scientific research studies concerned with the progress of national industry and environmental preservation. Therefore, the nature, as well as the purpose of SR&D organisations should be to conduct applied research rather than initiate academic endeavours.

For research institutions, technology transfer is defined in the words of the Association of University Technology Managers (AUTM) as *"the process of transferring scientific findings from one organisation to another for the purpose of further development and commercialization"* (WIPO, 2006).

Such technology transfer is generally effected by means of Innovation Patent (IP) licensing agreements (contracts) between and among scientific organisations.

In the licensing agreement, the research centre grants a permission (license) to use the IP in a newly developed technology to another scientific organisation in exchange for royalties or other payments. IP rights permit the scientific institute to own and control the use of the other institute's research results. In effect and in some cases, the technology transfer process is reciprocal, as both institutions exchange and co-develop new technologies.

In the case of KISR, technology transfer may be facilitated by transmitting or disseminating its scientific results to organisations, to a specific audience, or to society as a whole. In effect, this transfer may help educate and train specific public bodies in the innovation process and to some extent, generate income for the institute, as well for the government, and enhance future scientific studies; also, sustain strategic strategies in the organisation and boost commercialisation.

Evidently, through this study, the developed IS alignment framework will contribute to existing knowledge by providing a practical model for achieving integration between IS strategy and organisational strategy, and therefore, provide better support for SR&D organisational objectives.

The implementation of the IS alignment framework could also add to the existing body of knowledge, more to improve and conceptualise existing strategic alignment frameworks, which can be developed further in theory and practice.

1.5.2 From a Practical Perspective

The IS alignment framework developed in this research could contribute to practice by providing organisations with a road map for achieving alignment. It could serve to enlighten top level management such as Chief Executive Officers (CEOs), Chief Information Officers (CIOs), and to include planning and consulting teams, practitioners, and researchers with insights as to how to understand and achieve alignment within the system, eventually, to mitigate the gap of knowledge in this field.

For all practical purposes, Kuwait, represented by a case organisation like KISR through this research, could stand as a case study example among SR&D organisations with an eventual aim of understanding and achieving integration between IS and organisational strategies. In essence, the results of this study could also serve as baseline data to future studies on IS alignment in other developing countries.

1.6 The Significance of the Study

An examination of IS alignment literature shows that organisations are struggling to identify and manage alignment challenges (Chan and Reich, 2007b, Silvius, 2009, Levy et al., 2011). It presents little instruction or advice about conducting alignment between business and IS plans, and what organisations can do to understand, execute, and enhance alignment (Coltman et al., 2015). Moreover, the theoretical part of IS alignment studies (the what and why) have been more deeply researched, but in

contrast, the practical side (the how) still has not been widely studied (Kerpovsky and Galliers, 2015; Preston, 2014). In addition, most of the IS alignment studies revealed that the application of alignment has only been partially adopted at certain levels or within parts of business plans. The literature showed a lack of studies that have chosen SR&D organisations as a case study. SR&D is considered scientifically as a highly professional-led culture due to the number of staff with very high academic qualifications.

In summary, this study is significant for many reasons: Firstly, it helps the SR&D and knowledge transfer organisations to discover and deal with IS alignment challenges. Secondly, it fills the gaps that exist in such practical studies of IS alignment at the organisational level. Thirdly, it provides a practical framework that will guide the SR&D organisations to adopt IS alignment. Fourthly, this study has been granted privileged levels of access to obtain critical documents and data from national scientific and research centres. Fifth, this study is also significant, because it will add to the existing body of knowledge in this field and is especially relevant to developing countries such as the State of Kuwait, which has a very distinctive culture.

1.7 Structure of the Thesis

Chapter 1: Introduction

The background of the problem, research aims, and objectives are presented in this chapter. This chapter discusses the significance of conducting this study. In addition, it presents an overview of the study's contribution to knowledge.

Chapter 2: Literature Review

Chapter 2 focuses on the relevant literature identifying key definitions of IS alignment. Also, it explores research studies related to the organisational context of IS alignment and examines issues on IS alignment dimensions. A historical development of IS alignment thinking is presented in this chapter. Furthermore, planning processes for aligning IS with organisational strategy and policy are investigated. Finally, it explores relevant studies and provides a critique of the most cited and available IS alignment frameworks.

Chapter 3: Conceptual Framework

The aim of this chapter is to develop a conceptual framework for investigating IS alignment within an organisation. The chapter starts by describing the methodological approach to develop IS alignment implementation and adoption. Pettigrew's (1988) contextualism methodological approach was adopted as the basis of a theory for constructing the framework. The three dimensions and their elements are identified and described. The Context dimension is discussed in the beginning, as well as the

elements for this dimension, which are structural, cultural, and political aspects of the organisation. Then, the content dimension and the key drivers are described. The roles of top management, IS managers, and planning and support team in the organisation are discussed. The third element, the process dimension is then explained. Finally, the development of the research conceptual framework is presented and described.

Chapter 4: Research Methodology

A comprehensive review of research methodologies relevant to carry out this study is selected and explained in this chapter. The detailed research philosophy and approach is presented and the research design process and relevant schools of thought in the field are discussed. Lastly, the particular data collection methods and analytic tools and techniques chosen are explained and justified.

Chapter 5: The Case of the Kuwait Institute for Scientific Research: an SR&D Organisation

Chapter five presents an overview of the case study. It begins with a holistic overview about Information Technology in the State of Kuwait. The Kuwait Institute for Scientific Research (KISR) is described as a major Scientific Research and Development (SR&D) body in the country. Background context and information about the four departments of KISR research division are described, as well as all the units supporting with respect to IT and Information Systems (IS).

Chapter 6: Case Study Finding

This chapter presents a finding of the interview results from the content, context, and process domains.

Chapter 7: Discussion

This chapter discusses the findings of this study and proposes a practical road map for enhancing the level of aligning IS with organisational strategy. The aim of this chapter is to present a clear and critical discussion of the results and findings presented in Chapter 6. The discussion is categorized in 3 domains, an updated framework and a road map have been developed for enhancing IS alignment.

Chapter 8: Summary and Conclusion

This chapter presents the conclusions to this study and provides a summary of the research. Moreover, it revises the research aims, objectives, and questions. Furthermore, the chapter explains how this research tried to address and fulfill the aims of this study. In addition, it presents a discussion of the research contributions that the study has achieved on the subject of the IS alignment in SR&D organisations. Finally, it highlights the limitations of this study and suggests recommendations.

The thesis is structured around eight chapters. The flow of the chapters is organised according to the methodology proposed by Phillips and Pugh (1994), which comprises of (a) background theory, (b) focal theory, (c) data theory, and (d) the development of a novel contribution. Figure 1-1 illustrates an outline of the thesis structure.

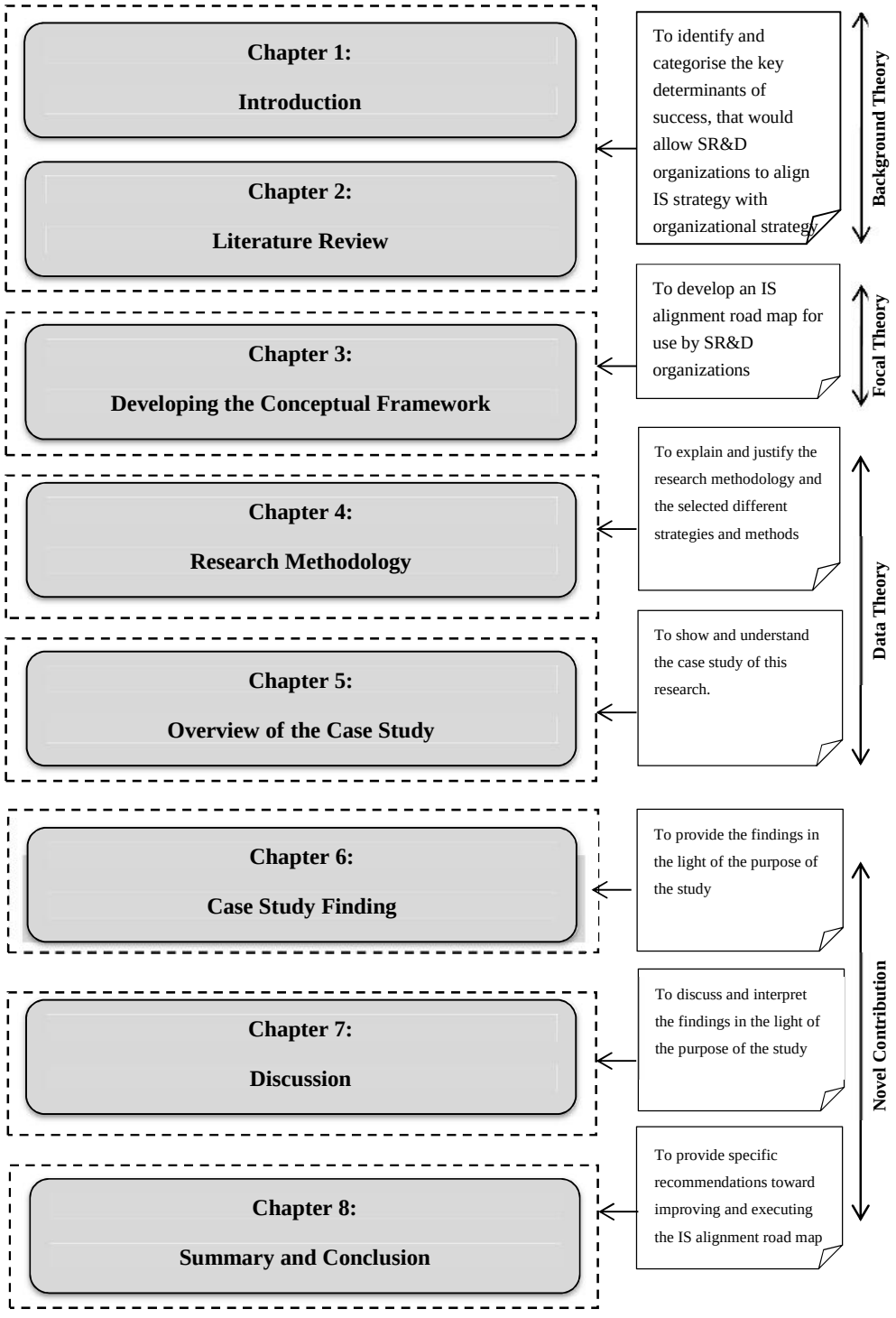

Figure 1-1 Thesis Outline

Chapter 2: Literature Review

2.1 Introduction

A review of the relevant literature has focused on identifying key definitions of IS alignment, exploring research related to the context of IS alignment, examining issues on IS alignment dimensions, historical development of IS alignment thinking, and planning processes for aligning IS with organisational strategy and policy.

Other topics covered in the review include a concise overview and critique of the most cited and available IS alignment frameworks.

2.2 Historical Development of IS Alignment Thinking

Peppard and Breu (2003) stated that it was in the late 1970s that research and development of approaches to IS alignment began. The purpose of most of the basic studies, based on theoretical and practical elements of developing IS alignment, was to find out the value of growing investments in IT for organisations. In most early research, the emphasis was on alignment as a strategic, top-down planning event, and this provided the IS alignment literature with several tools and methods. These included critical success factors and value chain analysis (Earl, 1989; King, 1978; Wiseman, 1985).

In IS alignment, the second phase of development acknowledged that alignment cannot be achieved by studying the link between organisational strategy and IS strategy only. Rather, this phase showed the significance of studying the IS structure and even the organisational framework (Ein-Dor and Segev, 1982; Morton, 1991). In the third stage of development of IS alignment research, there was emphasis on the alignment between IT contexts and strategic business contexts. In this stage, alignment was regarded as procedure and not as an occurrence (Broadbent, 1990; Henderson and Venkatraman, 1989, 1993; Broadbent and Weill, 1993). This claim on alignment research as a procedure, rather than an occurrence, is indicative of it, being 'mechanistic' in nature, too theoretical, and failure to capture real-life occurrences. Besides, strategic alignment is not guaranteed to succeed in the world of work, because strategy is not a clear concept due to volatility in the work environment that often leaves managers in confusion (Vitale et al., 1986). Furthermore, it is not desirable as an end per se, since business is ever changing; and therefore, IT has to challenge business and not to follow it. The recognition of the major methods and enablers of alignment in a dynamic context was taken into account in the fourth stage of development of IS alignment research. The attributes resulting in sustainable competitive advantages were researched in the studies in this stage (Earl, 1993, 1997; Keen, 1993; Ciborra, 1994; Luftman and Brier, 1999; Ross and Weill, 2002). The trends and focus of IS alignment research from its inception in 1980 are presented in Figure 2-1.

The figure illustrates the evolution of IS alignment research from its beginnings in the 80s to a foreseeable future research on developing an IS alignment framework for dynamic, complex, and distributed contexts. In the 1980s, studies were merely centred on IS alignment with strategies in the organisation; then, research levelled up to IS alignment with organisational structure and business structures. Apparently, experts in the strategic alignment field in the 90s have recognised the need for a more in-depth look into IS, not just aligning it with the organisational and business structures, but the urgency to develop an IS integration strategy with business. At this stage, the trend considers not only the structural dimension but also the culture of the organisation. From a futuristic perspective, a sustainable working model is called for in a more self-directed, multifaceted, and dispersed settings and environments, as in the case of scientific institutes that are multidisciplinary in nature.

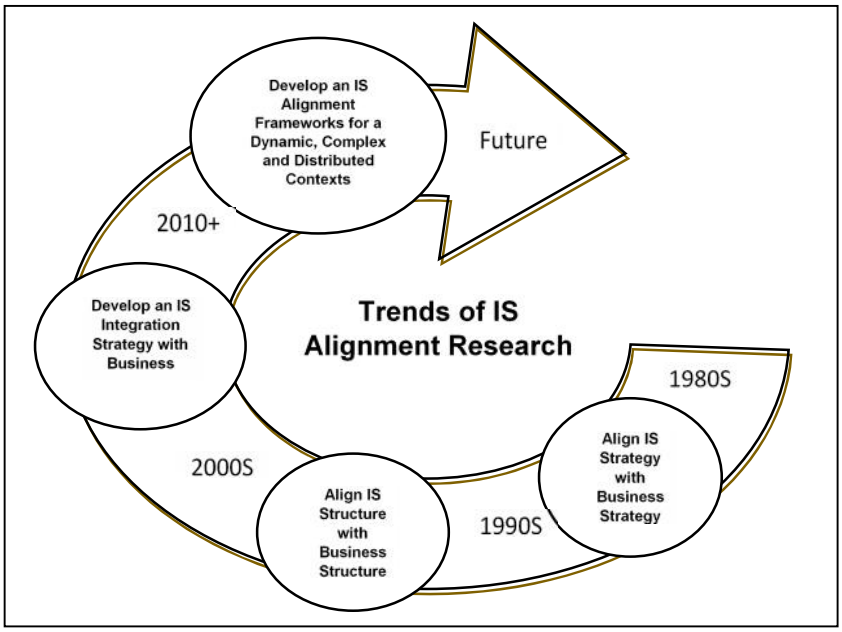

Figure 2-1: Trends of the IS alignment field 1980–2012

2.3 Defining Information Systems Alignment

The dynamic nature of IS alignment has been recognized in the literature; however, most studies have usually centred on the relationship between IS and business, only on a strategic level. In their study of IS alignment factors, Gutierrez and Lycett (2011) posited that from the previously identified factors, namely, IT governance, IT value, communication, scope and architecture, partnership, human resources skills, among others, their findings revealed that when high IS alignment was obtained, IT governance was the determining factor. Conversely, the root causes of a low level of

IS alignment within the areas of understanding IT by business, balance metrics, budgetary control, and shared goals, risks, and rewards are the organisational structure and business perception of the IT value. In addition, they found that a bigger IS alignment gap exists between the perceptions across strategic, tactical, and operational levels than the traditional gap between business and IS. This, in a way, explains the dynamic nature of IS alignment, from which can be drawn multiple sources of research from various disciplines.

IS/IT alignment is given various definitions, terminologies, and names. It has been referred to as strategic alignment (Henderson and Venkatraman, 1993); harmony (Luftman, 1996); strategic fit (Porter, 1996); linkage (Reich and Benbasat, 1996); bridge (Ciborra, 1997); integration (Weill and Broadbent, 1998a); fusion (Smaczny, 2001); IS alignment (Benbya and McKelvey, 2006); business-IT alignment (Luftman and Kempaiah, 2007); and IT alignment (Chan and Reich, 2007b).

Table 2-1 presents a summary of different definitions from past studies on alignment. As claimed by Avison et al. (2004), in all the cases of the IS/IT alignment, the main concept is about alignment of strategy between the organisation and its IT/IS (p.225).

Table 2-1: Summary of Definitions from Previous Studies on the Concept of Alignment

Concept	Authors	Definition
Alignment	- Broadbent and Weill, 1993,1998	- The degree to which business plans were supported, facilitated, and stimulated through information strategies
	- Luftman et al., 1993	- The degree to which business strategy supports and is supported by the IS strategy
	- Tallon and Kraemer, 2003	- The way information systems strategy and business strategy are aligned with each other
	- Chan and Huff, 1997	- The extent to which the resources being directed to all of the seven dimensions of IS strategy are aligned with the strength of the firm's stress on each of the matching seven dimensions of the business approach.
	- Maes et al., 2000	- It is a theory which is aimed at to exploit IT in a firm, for the efficient working of the firm through IT
	- Strassmann, 1998	- The capability to show an affirmative link between the recognized measures of performance and information technologies
Fusion	- Smaczny, 2001	- A process or act of integrating, uniting, or linking. Such a process leads to an integrated approach which changes in accordance with the variations in internal and external environmental conditions
Fit	- Luftman et al., 1999	- A central integration between business and IT and the strategic fit between strategy and infrastructure.
	- Henderson and Venkatraman, 1993	- It is the functional combination and internal fit between IS/IT strategy and business strategy, and the way this integration is essential in achieving a competitive advantage
Harmony	- Woolfe, 1993	- There is strategic alignment when a firm has harmonised its entire approach and its IT systems
Linkage	- Reich and Benbasat, 1996	- The extent to which the business's mission, aims, and plans are supported by those of the information technology.
	- Premkumar and King, 1992	- The connection of the company's business and IS plans
Coordination	- Lederer and Mendelow, 1989	- The coordination which can occur if the information system approach is taken from the organisational strategy
Integration	- Teo and King, 1997	- The strong points of the connection between business and IS/IT policies

Concept	Authors	Definition
Co-variation	- Kefi, et al., 2005	- The co-variation at a particular point of time between the features of business (partnerships and/or alliances) strategic choice, and those of IT/IS strategies (IS/IT systemic competencies, IS/IT strategic role, IS/IT processes selections, and IS/IT architecture selections)
Relationship	- Zviran, 1990	- The particular IS goals require customisation as per the goals of the firm
Partnership	- Henderson, 1990	- A working relationship that indicates a long-term commitment, mutual risk, and benefits, a feeling of joint cooperation, and other qualities aligned with theories and concepts of participatory decision making

Many researchers considered IS alignment as a process that supports the strategy of the organisation. Strategic alignment is defined by Luftman et al.(1993) and Broadbent and Weill (1993) as *"the degree to which business approaches are supported, facilitated, and inspired through the information strategies"* (p.164).

Similarly, alignment is defined by Reich and Benbasat (1996) as *"a linkage, meaning, the extent to which business mission, goals, and policies support and are supported by those of IT"* (p.56).

Moreover, it was claimed by Luftman (2000) that, *"the accomplishment of alignment is an evolutionary process for which there is the need for good working relation and cooperation, adequate prioritisation, good support from top management, good leadership, a comprehensive understanding of the business and technical conditions, trust, and effective communication*" (p.2).

According to Chan and Huff (1993, p. 53),"*strategic alignment is the extent to which the resources being directed to all of the seven dimensions of the IS strategy are aligned with the strength of the firm's stress on each of the matching seven dimensions of the business approach (analysis, innovativeness, aggressiveness, futurity, riskiness, proactiveness, and defensiveness)* (p.53).

IS alignment is described by other researchers as an occurrence or an event which arises through integration between business and IS strategy. IS alignment is described by Ross et. al. (2009) as a connection between the IT strategy with the goals, strategies, and processes used to accomplish the aims of the organisation.

Henderson and Venkatraman (1993) described IS alignment as "*the level of fit between IT and the business, and the integration between IT strategy, business strategy, IT infrastructure, and the infrastructure of the business."* This definition was adopted in this research, since it is focused on nearly all the key elements related to alignment and presents the critical success factors for the integration of IS with business strategy. Alignment, more specifically, is the extent to which information systems and businesses rely on each other and mutually share their domain knowledge to accomplish a common objective. Thus, all these features are covered in this definition.

2.4 The Different Dimensions of IS Alignment

There are acknowledged difficulties inherent in the alignment of business and IS strategy (Luftman, 1996, Hirschheim and Sabherwal, 2001, Ward and Peppard, 2002, Bunker et al., 2008, Gutierrez, 2011). The fact of strategic processes, being so complicated, is one reason for this difficulty (Gutierrez, 2009). When the strategic management literature is considered, the social and intellectual dimensions have to be understood and managed with regard to strategy complexity (Horovitz, 1984). Being complex in nature, the social, cultural, structural, intellectual, and strategic dimensions of IS alignment, which are already quite perceptible, are extremely important (Reich and Benbasat, 2000).

The social dimension of alignment is the condition in which the IT and business managers in an organisation understand, have shared ownership, and are dedicated towards the IT and business mission, goals, and plans. It focuses on the IS alignment teams (Reich and Benbasat, 2000, Schlosser et al., 2015).

Reich and Benbasat (2000, p. 82) found that, "*relative to the social dimension of IS alignment, the shared domain knowledge between business and IT executives is the strongest predictor. When there is high shared domain knowledge between the two groups, communication becomes strategic and frequent, thereby resulting influence to a high level of alignment. On the other hand, strategic and intellectual dimensions relate to the condition in which a superior quality set of interlinked IT and business plans are present*". Thus, this dimension implies the availability of relevant planning

tools and techniques. A central aspect involves having a formal strategic planning procedure. When there is no formal, documented plan, it will be hard to create alignment of the IS with the business (Lederer and Mendelow, 1989, Wang and Tai, 2003, Chan and Reich, 2007b). Somehow, this argument is a defence to the claim of critics that IS alignment during its third stage of development is critiqued as a procedure, rather than as an occurrence. Structural dimensions mean the degree of structural integration between business and its IS. Chan (2002) found that structural alignment is involved with IS location, reporting relationships, deployment of IS personnel, authority, centralised and decentralised models of organisation. He continued to state that there could be increased effectiveness in terms of the IS organisational structure if critical resource needs were to be supported at appropriate levels between the CEO and CIO.

Another essential aspect with regard to integration of organisational strategy and IS is the cultural dimension. For instance, Pyburn (1983) asserted that successful ISP could be accomplished when they are aligned with cultural aspects like top management communication style and business planning style. According to Silvius et al. (2009), there is an important role in terms of understanding the cultural dimension in IS alignment. In the same light, Godfried and Wilson (2013) declared that strategic alignment is strongly influenced by cultural dimensions through interactions with organisational level factors, for example, IS strategic planning processes and the level of partnership between business executives and information systems managers. They emphasised that in order to achieve IS alignment, managers have to consider and

evaluate the potential influences of national and organisational culture in the strategic design phase.

2.5 Information Systems Alignment Context

There are links between the IS alignment literature with other related fields like strategic IS management, strategic management, organisational culture, leadership, and other relevant theories. The context for this study and links with the related fields of literature are presented in Figure 2-2.

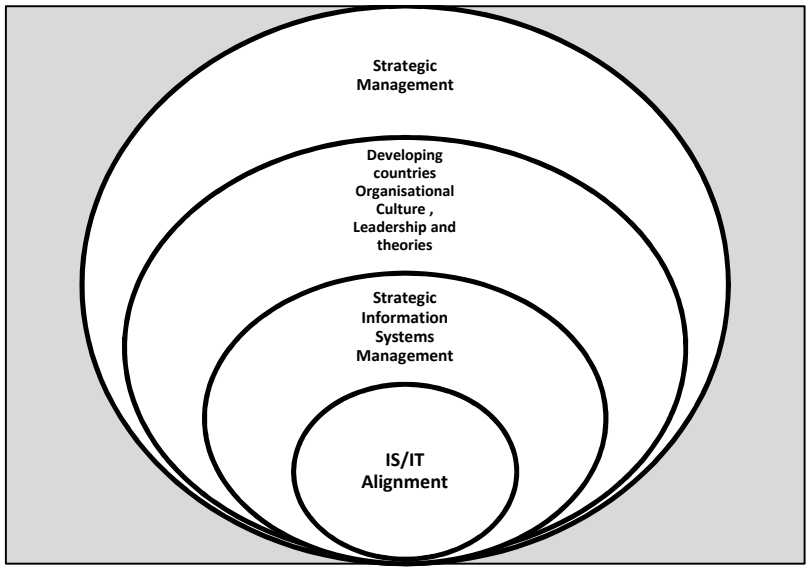

Figure 2-2 : IS alignment context

2.5.1 Strategic Management and IS Alignment

A basic definition of strategic management is given by Bracker (1980) which stated that "*strategic management involves the assessment of internal and external conditions of the organisation so as to maximise resource utilisation with regard to organisational goals"*.(p.221) Several authors defined IS alignment as a strategic matter, and that strategic elements are required to improve the degree of integration between business and IS strategy (Voss, 1989, Ken, 1995, Wainwright and Waring, 2004).

A more practical definition of strategic management was presented by David (2013). He defined strategic management as:

> *"The art and science of formulating, implementing, and evaluating cross-functional decisions that enable an organisation to achieve its objectives" (*p.35*).*

Another description of strategic management is that, it is "*a firm's apparent strategy for the current development and appropriation of value. Strategic management is simultaneously a short- and long- term plan to include planning and implementation* (Amason, 2010, p.7).

An important step for the alignment of the IS and organisational goals is to understand the processes of strategy planning and implementation. However, as studies would show, there is no consistency in approaches to strategy development. Ten schools of

strategy formation were explained by Mintzberg et al. (1999, 2009). In this context, the authors compared two different schools of thought, namely, descriptive and prescriptive. Prescriptive schools identify procedures for action on a particular part of the organisation as per the assessment of its role and the environment in which it functions. Descriptive schools, alternatively, determine the historical reasons for the present condition of the firm at a specific point in time. A summary of the ten schools of strategy formation is presented in Table 2-2

Table 2-2: Description of the Strategic Schools of Thought (Mintzberg, 1998)

Strategy Approaches	Strategy Schools	Description
Prescriptive Approaches	Design school	In this approach, the strategy formation is a process of conception. The strategic plan for the design school to accomplish a fit between the internal and external environment of the organisation. SWOT analysis is an important tool through which internal Strengths and Weaknesses are matched with external Opportunities and Threats.
	Planning school	Strategy is regarded as a formal process by this school. In the process of strategy formulation, the role of planning teams is quite significant. This includes logical steps like identification of goals, programmes, budgets, and operating plans, while taking into account the present situation for the development of different alternative situations.
	Positioning school	Here, strategy formation is regarded as an analytical process. Enhancement of the organisation's competitive advantage in its market is the goal of the strategy plan. The work of Porter (1985) strongly advocates the positioning approach.
Descriptive Approaches	Entrepreneurial School	Strategy formation is considered as a visionary process in this approach. Targets to be accomplished include the visions and outlooks of the charismatic leader.
	Cognitive School	Strategy formation is regarded as a mental process in this approach. Thus, the procedure of developing a strategic plan is impacted by the science of brain functioning. Additionally, major drivers to form the strategy plan include mind mapping, knowledge structure, and thinking capabilities.
	Learning School	Strategy formation is an emergent process as per this approach. While forming the strategic plan, the organisation relies on learning from trial and error with time.
	Power School	Strategy formation in an organisation, as per this approach, is based on a negotiation process between power holders. Those who allocated the powers could be internal or external such as stakeholders. In the planning process, negotiating, confrontation, and persuasion skills are quite significant.
	Cultural School	Development of strategy is regarded as a social or collective process. Thus, the organisation's culture impacts the strategy plan.
	Environmental School	In this approach, strategy formation is a reactive process. The strategy is developed as per the capability to manage the external environment players and the way to handle the difficulties.
	Configuration School	Strategy formation is regarded as a process of transformation. This positions the organisation from one situation to another situation of the decision making process.

The taxonomy of Mintzberg et al. (1999, 2009) certainly provided a broader perspective of the organisation's strategy process. In addition, these strategy formation processes can even be observed in the process of developing and implementing the IS strategy. However, the IS strategy should correspond to that of the organisation's strategy, thus, emphasising that the elements and critical success factors for the IS strategy are essential and important (Voss, 1989, Ken, 1995, Wainwright and Waring, 2004).

It was observed in the literature that there should be a strong connection between IS planning and the organisation's strategic plan. The role of IS planning is to align the information technology capabilities with the organisation's objectives. For instance, it was observed by Gutierrez (2011) that it would be beneficial for the organisation if the IS senior management is also part of the strategic planning process. This would make sure that an organisation's aims and objectives are accomplished by the IS functional units. Likewise, Heckman (1998) confirmed that a fundamental role of line managers is to become part of the integration process of both the organisation's strategy and IS strategy.

Henderson and Venkatraman (1993) reported that one reason for the inability of an organisation to understand the value of its IT could be the incorrect alignment of the IT strategy with the organisation's strategy.

The manner by which Management Information Systems (MIS) planning and competitive strategy can be aligned was designed and proposed by Das et al. (1991).

They presupposed that if an organisation's strategy and the MIS were aligned, this would put the organisation at an advantage in matters of obtaining market opportunities, achieving the information required for making strategic choices, and maximising the efficient use of resources. The notion of fit between competitive strategy and strategic MIS planning as a key aspect in enhancing the organisation's financial performance is presented in the model. Thus, the former phases of IS alignment research can be seen in Das et al.'s original framework (1991) (Figure 2-3).

Das et al. (1991) stated six kinds of strategic alignment:

- Uniformity of choices in the process dimension of the MIS planning tasks
- Uniformity of choices in the content dimension of the MIS planning tasks
- Uniformity of choices between the aspects of process and content dimensions of the MIS planning tasks
- Fit between the competitive approach and the process dimension of the MIS planning tasks
- Fit between the competitive approach and the content dimension of the MIS planning tasks

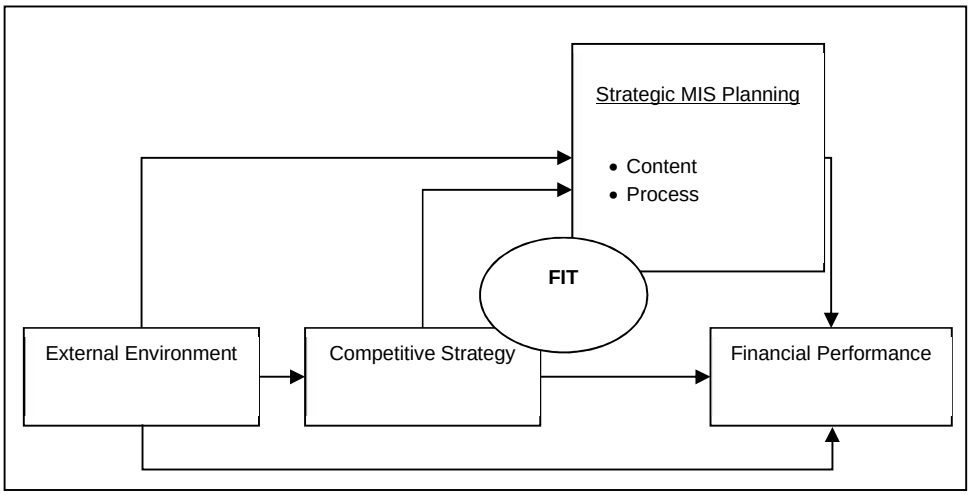

Figure 2-3: Das et al. (1991) IS Alignment Framework

- Uniformity in the interaction of process and content elements with competitive strategy.

Although Das et al.'s framework is entirely theoretical and has no empirical reasoning, they stated that the suggested framework represents a thorough but constricted outlook of the strategic MIS planning content. In the literature, these variables have been the topic of much interest and have led to a number of classifications. These variables are synthesised in the present framework at the competitive strategy level. Related variables are integrated by this synthesis into coherent dimensions. This leads to the need for future empirical studies to improve, support, or enhance these dimensions. It even works as *"a starting point for directing future research in this field"* (Das et al.,1991, p.976).

Segars et al. (1998) stated that the planning of strategic IS and the business and strategy plan of an organisation should be performed together. In addition, Botten and McManus (1998) claimed that firms could benefit from this integration of organisation strategic planning and IT planning. They mentioned that "*integration of the information systems and an organisation's strategic plans is a fundamental attribute in the formation of the IT-enabled competitive advantage. Essentially, when there is long-term IT; then, a degree of strategic validity is accomplished"* (p.18).

According to the literature, an organisation's strategic plan and the IS plan are interlinked. Both plans should not be separated and should be worked on together. It was also apparent that leadership style was one of the critical success factors of strategic planning and for IS alignment. Good leadership from the CEO and CIO and a better understanding of the IS's role in a firm are important for the accomplishment of financial performance and of strategic goals.

2.5.2 Developing Countries and Information Systems Alignment

Studying IS alignment in developing countries is the scope of this research. These countries are investing a considerable amount of their budgets with the aim of developing their IT infrastructure. Yet in developing countries, there is scarcity of understanding regarding the notion of alignment between organisational strategies and IS strategy. This could result in the formation of an unfavourable condition for the IT investments (Alfaouri, 2004).

Developing nations have just recently started comprehending the significant role of IT in solving their strategic issues (Almajali and Dahlin, 2010, Straub et al., 2001). Some difficulties are faced by Arab countries, as some developing countries experience a lack of well-developed IS and a dearth of established IT organisational structure, processes, and culture (Al majali and Dahlin, 2010, Straub et al., 2001). The most significant factors that impact the application of the IT in developing nations have been stated by Aldhmour and Shannak (2009). These include the small size of organisations, inadequate IT/IS infrastructure, lack of planning experience, low levels of IS maturity, strict governmental rules, social and cultural perspectives, and a shortage of IT/Enterprise human and technical resources.

Aladwani (2014) stated that overall in Kuwait, and specifically in that geographical region, there are not many studies regarding business-IT alignment. He mentioned that up until now, there have been few studies in developing countries regarding the essentials of IT planning. This is problematic, because IT management guidelines and practices that are successful in one culture might not be effective in other cultures (Aladwani, 2001).

As asserted by Hofstede (1980), developed and developing nations have differences with regard to cultural factors. Four essential dimensions of culture are presented such as the following:

- Power distance, meaning in that, the concentration of power is typical to the given culture. The power could either be influenced between a manager and employee, or it could be interpersonal.
- Uncertainty avoidance, meaning in that, when employees feel vulnerable due to uncertain rules or structured tasks.
- Individualism, which is referred to when employees take care of themselves or their families.
- Masculinity, meaning in that, when different roles are played by employees as per gender or sex differences.

The research of Aladwani (2001) is a good example of Hofstede's cultural scheme. The contrasts of the culture of Kuwait with the United States are understood through this study. A United States culture was observed to have low uncertainty avoidance, low power distance, moderate masculinity, and high individualism. Conversely, Kuwait has high uncertainty avoidance and power distance, with a moderate score on masculinity and less on individualism. Thus, a study of the IS alignment in the actual Kuwait context could lead to the required knowledge to comprehend ways of accomplishing the integration between business and IS strategy.

Numerous research studies have been conducted to determine the ideal practices in IS planning that could lead to the accomplishment of strategic alignment.

Pavri and Ang (1995) declared that limited IT planning-related research has been done concerning organisations based in the developing world. In this regard, it is necessary

for the CIO to focus on IT planning in the Third World (Palvia, 1997). In the Gulf Cooperating Council (GCC) countries, the main hurdle for the IT managers is the gap existing between the IT and businesses (Abdul-Gader, 1992). However, Aladwani (2000) seemed to have a more positive inference where Kuwait is concerned, as over all the GCCs, he indicated that IT planning in the country is a top priority for the people related to the field, as it is in most parts of the rest of the world. If the IT managers in Kuwait are unable to develop an IT plan keeping the local environment in view, more problems will be created, and not many opportunities are open. Therefore, he urged Kuwait to develop policies that can frame an IT plan that is practically implementable.

Aladwani (2001) conducted a study to determine the factors which shape the IT planning in the developing world. He tried to expand the existing literature on the subject of IT planning by determining how the guidelines put forward by researchers in developed countries can be implemented in Kuwait. To explain why IT planning implemented in the western countries would be different from the planning in Kuwait, he introduced a model based on the elements that can influence the output of IT planning. The model was based on three main elements behind effective IT planning given in Boynton and Zmud's similar work (1987) as follows:

- The elements of IT are determined by the extent of the usage of the IT in a given organisation.

- Organisational factors are determined by the IT management and its involvement, the involvement of the people using the technology, and the availability of finances for the implementation of the IT policy.
- The environmental factors are determined by evaluating the internal and external environmental components. That government policy is part of the external environment and is viewed from the perspective of high ranking management officials in government agencies about the policies of the government for different parts of the private sector.

In the same study, involving 66 different private companies in Kuwait, Aladwani (2001) found that the involvement of management was vital for the IT planning process to be successful. The author highlighted the fact that the culture of the state is such, that people with power and authority have greater weight in matters of decision making. Powerful decision makers play a crucial role in the planning of any project. The management officials also need to be aware of the technology and to effectively communicate with the decision makers to ensure that the IT plan developed is effective and in accordance with the objectives of the organisation. This would lead to a greater integration of IT with the business sector.

It has also been found that if the policies of the government were liberal, the IT planning would become more effective, as the companies tend to make full use of the potential of IT in order to gain an edge over their competitors.

> *"This result shows that whatever the government authority responsible for national IT planning in Kuwait is doing now, it is doing it the right way. The authority in this small country is probably exerting adequate effort to liberalise government IT policies, to develop a national IT manifesto, to advocate investments in cutting-edge information technologies, and to make an entrance for IT into the economic system of the country" (Aladwani, 2001,* p.61*).*

Be that as it may, the research has found no profound linkage between the extent of the usage of IT, the involvement of the users, and the financial resources available for IT planning to be effective. It was deduced that the same research conducted elsewhere may have different results, probably due to the differences in culture between the western countries and the developing world. In a developing country such as Kuwait, the use of IT by the individuals is determined by the culture of the country. It may even be assumed that the users in such a country like Kuwait, do not have the same level of authority in decision making as the high ranking officials do, when it comes to developing a national IT policy. The common people's input in determining the IT policies is simply not considered (Aladwani, 2001).

2.5.3 Strategic Information System Planning (SISP) and IS Alignment

Hann and Weber (1996) put forward three objectives of Information Systems Planning (ISP):

- Identifying organisational issues and opportunities where effective implementation of IS could be done
- Determining the resources required to enable effective application of IS on these issues and opportunities
- Forming approaches and processes that enable effective application of IS on these issues and opportunities.

The role of SISP corresponds to ISP. Newkirk and Lederer (2007) stressed that SISP can be primarily described as the procedure of finding out the computer-based application portfolio that can assist organisations in accomplishing their goals. The link between IS and SISP alignment is explained by Doherty et al. (1999), stating that, "*variations between SISP and the planning tasks that pre-dated it, are in the context of the apparent stress on competitive impact and strategic alignment*" (p.264). Simply put, the emphasis should be on how an organisation can have its competitive edge over other organisations in its strategic alignment strategy from its planning stage to its implementation.

The link between IS alignment research with the body of research regarding SISP is evident in a study performed by Amrollahi et al. (2013). The authors used a systematic literature review method in this research. Twelve leading IS journals of the past 10 years have been utilised to answer the research questions regarding the context of the SISP research being performed to present, the approaches and procedures used in the SISP research, and the aspects dealt with by researchers working on the SISP. A

classification of the major research elements in SISP was provided by the authors. It is clear through one of the research outcomes that IS alignment studies represent 37% of the SISP literature and the necessary studies in this field. It was observed by Amrollahi et al. (2013) that the 17 papers found in this field are regarding subjects like "*in-depth plans for alignment, effect of strategic IS decisions on business approaches, how alignment is impacted through planning, the alignment in various contexts like particular industries, inter-organisational relations, and developing nations*" (p.52).

Moreover, the second important subject discussed was the development of a strategic planning process for IT.

2.6 IS Alignment as a Planning Process

It has been accepted by IT experts that planning is an important matter faced by the CIO. Thus, the CIO has to carefully plan strategic IT resources due to the double pressure of external and internal contextual forces. A focus on the context of planning may add up to alignment success (Aladwani, 2001).

Numerous research studies have been conducted to determine the ideal practices in IS planning that could lead to the accomplishment of strategic alignment.

2.6.1 Information System Alignment and Organisational Process Re-Engineering

In the 1990s, the Management of Information Technology research program was published after having been initiated in 1984 to study the impact of IT on organisations (Morton, 1991). The MIT90s framework was an important output and contribution from the research program, reported to have been useful for re-engineering business processing and for determining the effect of IT on organisations. As illustrated in Figure 2-4, the MIT90s framework defines organisations in the context of five factors which are in dynamic equilibrium among themselves. This is also when the organisation is impacted by factors from the external environment.

These factors are as follows:

- Technology: Information Technology can be applied to support business performance. Scott Morton noted that the good practices in using IT assist organisations toward increasing their effectiveness and efficiency.
- Individuals and Role: This factor is concerned with human resources in the organisation, the knowledge and skills they need, the quality of training programs, and the quality of policies and procedures in the organisation.
- Structure: Concerned with the effectiveness of organisational frame and partitions and the linkage between sections and departments. Adopting IT may require changing the organisational structure on account of the effect of IT on the organisational processes and practices.

- Management Processes: Enabling IT will affect the sequences of activities that are adopted in the organisation in order to achieve the required tasks. Moreover, the IT impact may reflect on the power and control distribution within the organisation.
- Strategy: Aligning the IS plan with the business plan is a challenge to all organisations on how to gain a competitive advantage and to achieve the organisation's objectives.

To achieve the organisation's goals, these aforementioned five forces must be modified with time. Organisations must concentrate on their culture if alterations were to be made in accordance with the developing technology.

Two kinds of business environments are outlined in the framework, namely, the internal environment, which includes the previously mentioned five factors; and the external environment of organisations, comprising the external environment of science and technology development and the external socioeconomic environment.

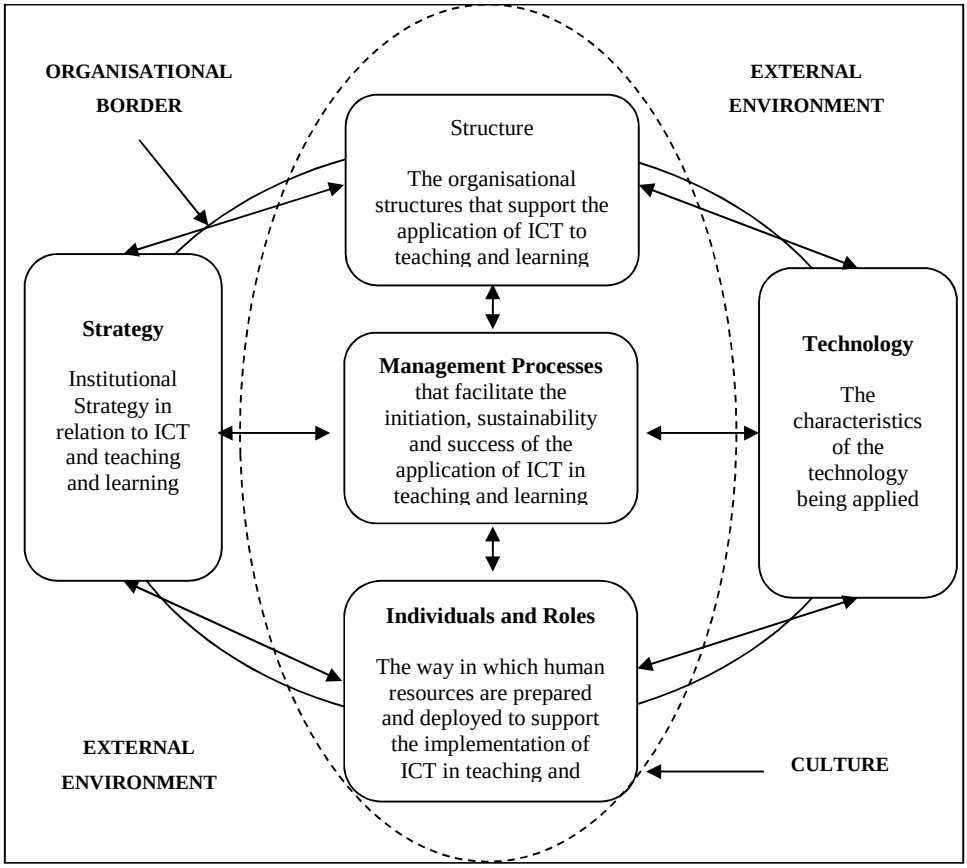

Figure 2-4: The MIT90s Framework (source: Morton, 1991)

Evidently, if organisations were to bring about a careful transformation, they should consider a holistic perspective of these five factors and their interaction (Scott Morton, 1991).

Providing the organisation with a conceptual perspective of the way to reduce the gap among all factors is the key advantage of the MIT90s model, for example, from the social and IT perspective. The impact of the IT on various dimensions of the

interaction is also clarified in the model. However, there are major weaknesses like the following:

- The difference between Information Management, IS, and IT and the part played by each domain in the organisation is not taken into account in the framework.
- A solution for reduction in the gap between social factors and individual roles is not provided in the framework (Gamayanto, 2004).

Business process re-engineering was implemented by many researchers as a technique for integrating IS with organisational strategy. According to Pollalis (1996), alignment of the IS plan with the organisation plan is one of the goals of business process re-engineering; whereas, Lockamy and Smith (1997) argued that a strategic alignment framework is needed for effective business process re-engineering projects. The link between strategic planning and business process re-engineering has been studied by Earl et al. (1995), recommending a framework for the incorporation of an organisation's strategy, processes, and their IT.

The challenge of accomplishing IS alignment was posed by Benbya and McKelvey (2006), declaring the lack of research that considers the co-evolutionary nature of alignment. Thus, a framework was suggested for assessment of the role and nature of IS alignment with firms that includes a co-evolutionary concept of the IS alignment at three levels of analysis such as the following:

- Co-evolution of IS strategy with business strategy and strategic level,

- Co-evolution of IS department with the business and operational level, and
- Co-evolution of IS infrastructure with users' needs and individual level.

To favour this co-evolution at various levels, interaction between each level and some critical enabling conditions are proposed.

The co-evolutionary framework, shown in Figure 2-5, highlighted the complex and interrelated nature of the relationship between the different components. Furthermore, the authors argued that they adopted a holistic rather than a bivariate conceptualisation of alignment. Therefore, the co-evolutionary concept may be similar to the concept of business process re-engineering, in this regard.

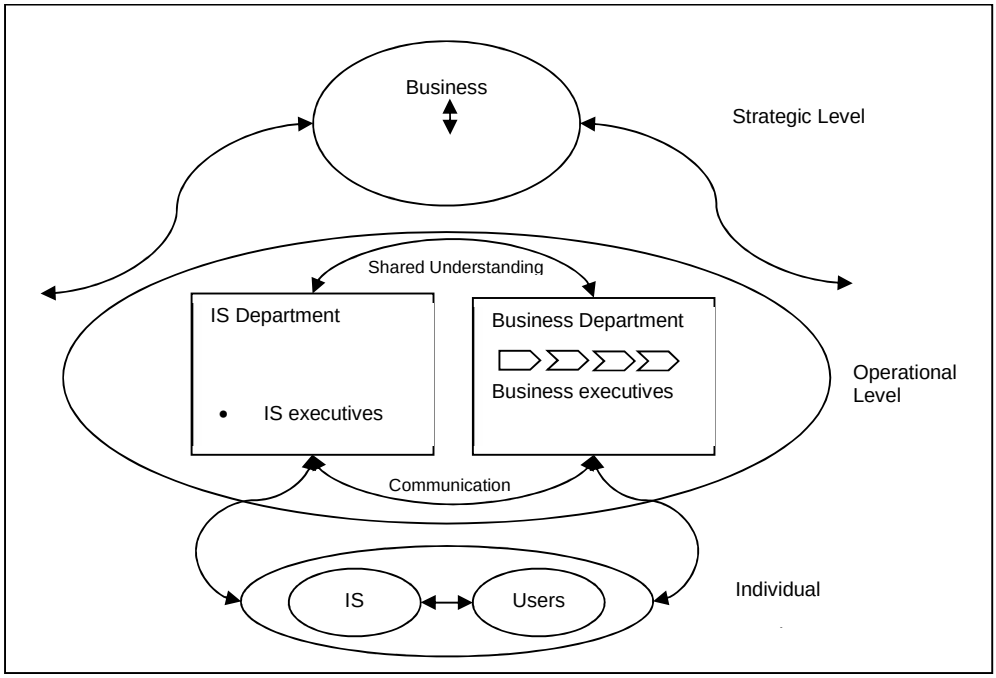

Figure 2-5: Co-evolutionary IS alignment framework (source: Benbya and McKelvey, 2006)

A closer look at the aforementioned framework shows a two-direction alignment, i.e., the horizontal IS alignment referring to the relationship between business and IT and the vertical IS alignment referring to the interaction between the different levels. Seemingly, implementing this framework could be difficult because of the lack of balance and harmony between the components.

Business process re-engineering allows the organisation to redesign the business processes and activities to promote and improve their performance by using the potential of information technology. Furthermore, successful business process re-engineering would require efficient change management practices and plans, as well as the integration of all of the organisation's components such as IT, human resources, and strategic objectives.

2.6.2 Strategic Alignment Model (SAM)

The Strategic Alignment Model (SAM) was designed by Henderson and Venkatraman (1983) for conceptualising and guiding the rising field of strategic management in the IT. They declared that the aim of their work is "*to formulate a model that outlines the range of strategic options that managers have and discover how they are interlinked*" (Henderson and Venkatraman, 1993, p.5).

SAM was initially suggested by the authors to enable organisational transformation and also exploitation of the IT competencies in its competitive role (Henderson and

Venkatraman, 1989). Subsequently, the views were further developed in later works (Henderson and Venkatraman, 1999).

Four central domains of strategic choice define SAM, namely, IT strategy, business strategy, IT infrastructure and processes, and organisational infrastructure and processes. Each domain has its own fundamental dimensions. The power features of strategic management are demonstrated in the SAM as follows: functional integration (integration of business and functional domains) and strategic fit (interlinks between internal and external elements). The basic features of Henderson and Venkatraman's model are presented in Figure 2-6.

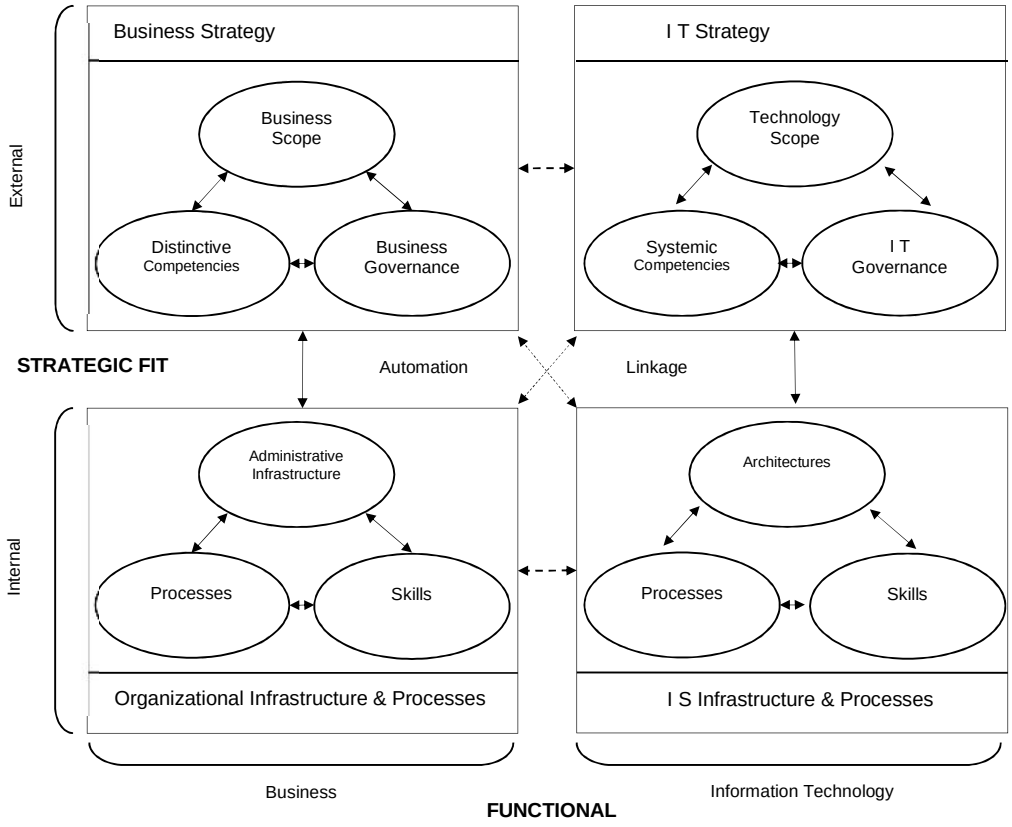

Figure 2-6: Henderson and Venkatraman's (1999) strategic alignment model

As highlighted by Henderson and Venkatraman (1993), both external and internal organisational environments should have strategic alignment. Thus, a firm's internal elements like infrastructure and IT processes should be integrated; while an organisation's IT and business should fit with the industry and technological drivers in the external environment.

The purpose of the SAM is to guide the strategic management of IT, and its spirit is that alignment is a dynamic matter. The SAM allows us to understand the management and organisational processes required for managing IT (Earl, 1997). A number of researchers have used the SAM as a foundation for further research and the development of frameworks, for instance, Luftman and Brier (1999) used SAM as a methodology for implementing IT strategy; Hu and Huang (2005) integrated SAM with the balanced scorecard approach, and Avison et al. (2004) used SAM at a financial institution. Several research studies that have utilised SAM are presented in Table 2-3.

Table 2-3: A Summary of Research Studies Related to SAM

	Author / Year	Study Title	Research Method	Results
1	(Presley, 2006)	ERP Investment Analysis Using the Strategic Alignment Model	Conceptual, case study investigation	The SAM was utilised in this research to lead to an analytic network process model (ANP). Formation of the ANP model was aimed at to facilitate the assessment of enterprise resource planning (ERP) and to help with the alignment of ERP investment decisions with strategy. According to the author, the SAM is beneficial for investment analysis. Moreover, the proposed ANP model helps in performing the SAM for investment analysis, since it is easy to implement and has a robust format with regard to decision making.
2	(Coleman and Papp, 2006)	Strategic Alignment: Analysis of Perspectives	Conceptual, Multi-year case study investigation using a web-based model	The author wanted to resolve the research question regarding the way strategic alignment has been functioning, and for this, the analysis of an organisation's business and technology strategy was done in a multi-year study. The author observed twelve alignment perspectives through the SAM. Eight distinct perspectives were achieved from the various quadrant combinations of the SAM. Four fusion perspectives were obtained through integration of two of the distinct perspectives. A web-based model has been developed to know the importance or correlation between organisations and the represented industries and their particular alignment perspective. Both tool and service are presented in the model which could lead to outcomes and propositions regarding better alignment.

	Author / Year	Study Title	Research Method	Results
				The study indicated that several industries prefer particular alignment perspectives. In addition, further study of longitudinal data seemed to have led to different forms of strategy development between industries.
3	(Wehmeyer, 2005b)	Aligning IT and Marketing – The Impact of Database Marketing and CRM	Case study, investigating two case studies to explain the IS alignment processes	The conceptual differences between customer relationship management (CRM) and database marketing have been examined in this study. Particular emphasis has been on the use of the SAM model in both approaches. According to the study, the SAM is useful for explaining the conceptual distinctions between the CRM and database marketing. Moreover, the SAM is a useful model for the assessment of managerial tasks and marketing approaches.
4	(Avison et al., 2004)	Using and Validating the Strategic Alignment Model	Case study (financial services firm), data from 55 completed projects	It was indicated through the study that the SAM has a conceptual significance. But, there is a need for further clarification regarding practical use of this model. Thus, a practical model has been suggested in this study. Through this model, IS would determine the degree of alignment in organisations. It would also help with keeping a check and altering the required aspects that influence the alignment. The authors alleged that there are greater chances of accomplishment of IS alignment in practice, if this framework is implemented.

	Author / Year	Study Title	Research Method	Results
5	(Gimenez and Rey, 2004)	Interactions between Information Technologies and or Organisation: A Conceptual and Empirical Approach	Survey of 50 medium - sized companies	The major elements regarding interaction between IS and its links with various aspects of an organisation, like processes formed by the system and the structure, were examined in this survey. There were two stages of the research. First stage involved revision of some recognised interaction models {(The Scott Morton model revised by the SAM:(Orero et al.; OFF; Silver et al., 1994; Suarez, 1997)}. The second stage involved an empirical study of 50 medium-sized organisations. It indicated the major findings regarding the various interactions between the organisations and their IS. This was presented as an empirical contrast to the suggested conceptual framework.
6	(Hirschheim and Sabherwal, 2001)	Detours in the Path toward Strategic Information Systems Alignment	Case study of three organisations	A multidimensional perspective of SAM has been utilised in this research. Three alignment profiles have been identified in the study as follows: -Utility (alignment by way of low-cost delivery): When the organisation implements a defender approach and selects a suitable IS strategy known as Utility. -Alliance (alignment by way of partnership): When the firm implements an analyser approach and selects an IS strategy that helps with business strategy and determines the available opportunities.

	Author / Year	Study Title	Research Method	Results
				-Infusion (alignment by way of business leadership): When the organisation implements a prospector approach and selects an IS approach that will enable creation and modification of a market. A framework to be used by firms is developed when the three strategic IS alignment profiles are used together, and there is clear recognition of the likely problematic trajectories, and the major factors explaining these trajectories are recognised. The proposed framework would be beneficial for organisations when working on strategic IS realignment attempts. The key benefit of these three case studies is indicating the aspect that the dynamic and evolving nature of business IS alignment should be understood by organisations.
7	(Smaczny, 2001)	Is an Alignment between Business and Information Technology the Appropriate Paradigm to Manage IT in	Conceptual	The author aims to resolve the research questions in this study as follows: Is the alignment between business and IT a suitable model to address the IT function in present organisations? According to the author, the SAM does not provide organisations with practical solutions anymore through which IS alignment could be accomplished. This is even if researchers and practitioners take into account SAM's development and progress over the years. This is because of the evolving nature of current organisational environment. Thus, a beneficial conceptual model has been suggested as an alternative to the SAM. This model highlights the concept of fusion, in which one strategic approach for the organisation and one set of operational plans are supported. The author claimed that business and the IT have to be formed and applied at the same time.

	Author / Year	Study Title	Research Method	Results
		Today's Organization		This information even impacted the role of the CEO to work on becoming strategists.
8	(Burn and Szeto, 2000)	A Comparison of the Views of Business and IT Management on Success Factors for Strategic Alignment	Case study using a questionnaire	In this research, SAM has been utilised to form a survey that would identify the elements that add to effective strategic alignment. Moreover, the study examined if there are any considerable variations in the viewpoint of business and the IT managers. As indicated in the outcomes, there is consistency in the business and the IT managers' views. Managers of both fields agree in their general perspective, that is, technology transformation and organisational driver, being the business strategy. Yet, the authors pointed out that the SAM is not practical; thus, they presumed that SISP could lead to successful IS alignment. It was proposed by the authors that organisations should focus on competitive potential and technology transformation.
9	(Papp, 1999)	Business-IT Alignment: Productivity Paradox Payoff?	Longitudinal (5 years) case study of 500 firms	The SAM was utilised in this research as a framework and theoretical construction. The study was to suggest a financial performance measure by the use of which a company could benchmark itself in comparison to its competitors controlling for industry classification or related alignment perspective. Seven financial elements of alignment impact on financial performance are presented by the author such as expected performance, earning, income, liquidity, net profitability, growth, and debt-to-equity.

	Author / Year	Study Title	Research Method	Results
				In addition, a regression equation was suggested by the author. Through this, performance could be measured with regard to alignment perspective and industry categorization, so that firms could have an idea of their ranking, on average, within their own industry and among companies that observe the same alignment perspective. Certain general guidelines and measures are also proposed by the author to help and improve performance and alignment of IT as follows: • Understanding as to how to identify and leverage IT within your organisation so as to maximise efficiency; • Evaluating the organisation's viewpoint by using the alignment model; • Providing an explicit and beneficial role to everyone in the organisation so as to enable synergy between business and its IT; • Including financial measurements that are appropriate for your specific industry when alignment is analysed; and • Never ceasing to analyse the alignment in an organisation, knowing that it is an ongoing and evolving process that needs continuous observation.
10	(Baets, 1996b)	Some Empirical Evidence on IS Strategy	Case study, literature review, simulation	SAM has been used in this study as a theoretical foundation. The study was aimed at to determine key issues and find out the links between these issues, as per the research project in many European banks. The author indicated that a reason for difficulty of application of the IS strategy could be a lack of awareness regarding banking matters. It could also be for difficulty

	Author / Year	Study Title	Research Method	Results
		Alignment in Banking	tool, interviews, and survey	of application of theoretical knowledge regarding IT to the actual business environment. Moreover, the study outcomes indicated that it is the scarcity of knowledge regarding the banking industry that could be considered a significant boundary for better alignment of IS, and not the capabilities of banking managers.

Nonetheless, there is yet the need for further explanations to be able to comprehend the alignment process. Moreover, there is a need to study SAM in that, regarding if and when misalignment could be valid, what are the features of the organisations that require IS alignment, and the way to determine the priorities of the factors of IS to achieve a good degree of alignment (Earl, 1997). The SAM is still a theoretical concept and is not yet fully supported by empirical studies.

Notwithstanding, much has yet to be desired in matters of IS alignment in both the business and organisation sectors. More in-depth studies are called for, to examine and analyse various aspects of the organisation, not to mention, designing other strategic alignment models that could serve as a better fit to the evolving nature of business, alongside changes and challenges attached to every phase of growth and progress.

2.6.3 Earl's Organisational Fit Framework (1997)

A framework using SAM (Henderson and Venkatraman,(1993) as a basis, was designed by Earl (1997). He posited that this Organisational Fit Framework (OFF) was based on a "*simple and efficient outlook of the way executives appear to be able to conceptualise strategic decision-making regarding IT*" (p.1).

There are four strategy domains in OFF. These domains, which are assumed to be connected and interdependent consist of Organisational Strategy, Information Management Strategy, Information Technology Strategy, and Information System

Strategy. OFF (Earl, 1997) is presented in Figure 2-7. There are two components or subsets of each domain, and each of these has two imperatives, signifying that the elements or considerations should not be forgotten and therefore, should be implemented.

This framework is aimed to provide a technique that enables organisations to incorporate their information resources with the strategic approach. The significance of the interconnection among all domains stated in the OFF was emphasised by the author to align IT with the organisational strategy.

Four interaction processes were assessed by the author, and these were the following:

- Clarification is the effect process of organisational strategy over the remaining domains.
- Foundation is the effect process of the IT strategy over the remaining domains.
- Innovation is the effect process of the IS strategy over the remaining domains.
- Constitution process is the effect process of Information Management (IM) strategy over the remaining domains.

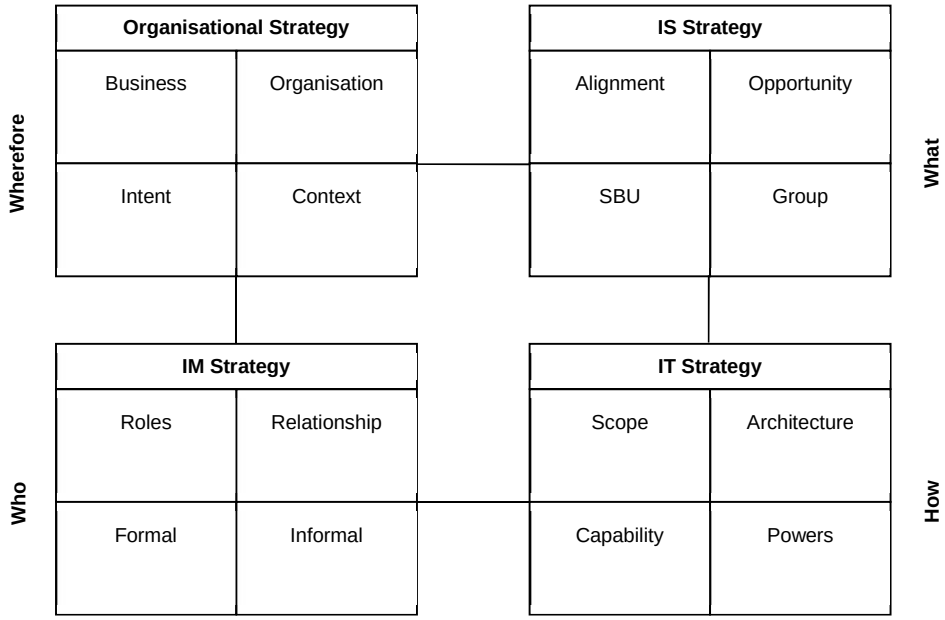

Figure 2-7: The organisational fit framework (source: Earl, 1997)

A comparison of SAM versus OFF is presented in Table 2-4.

Table 2-4: A Comparison between SAM and OFF

SAM	OFF
Has a more deductive nature out of strategic management theory	Has a more inductive nature out of information management matters
Is more inclined toward strategic positioning and alignment	Is based on organisational capability and correspondence
Could be more of a conceptual structure	Is a managerial checklist
Includes two strategic domains.	Includes three information domains. A fourth domain, the organisational strategy will also be added.

The connections between domains are handled by OFF. A test of the IM strategy is performed, as it delivers a constitution through which current IT matters could be addressed. To receive orientation for the IT decision-making, a test of the IS strategy is performed. To receive clarity regarding purpose and context for the IS, an acid test of a firm's strategy is conducted. An IT strategy test or architecture test is conducted, since it is believed that it is a basis for conducting business in today's information age.

2.6.4 A Critique on the Works of King (l978) and King and Teo (1996, 1997, 2000)

Integration between business planning and IS planning models was first adopted by Nolan (1973). He suggested four stages of calculating growth, moving in an S-shape to name, initiation, contagion, control, and integration. Later, two more stages were incorporated by Nolan (1979), to name, data administration and maturity, transforming it into a six-stage model.

A major topic of research by King and Teo was the integration between business planning and information systems planning. King (1978) beforehand argued that "*information systems planning in an organization has basically not been very directly linked with strategic planning through which an organization works on its future plans*" (p.27).

King (1978) observed that the literature of MIS focuses on how to design and develop effective systems, as well as to illustrate the structure and processes for such a system.

Moreover, King found that the reasons for the failure of many MIS is the pursuit of efficiency and cost saving rather than to support an organisation's goals and objectives. Therefore, the purpose of the research study was to describe and conceptualise the MIS strategic planning process as one, which integrates the "organisation's strategy set" to "MIS strategy set". An Information System Planning (ISP) method referred to as Strategy Set Transformation was suggested by this same author. Through the MIS strategic planning framework, such an approach is given which changes an "organisation's strategy set" comprising of mission, strategy, objectives, and other strategic factors into an "MIS strategy set", comprising of system's goals, limitations, and design principles.

King (1978) mentioned that a significant feature of the MIS strategic planning process is that "*it makes sure that the MIS is designed as an important component of the organisation and not just added to it*" (p.36).

The use of Strategic Set Transformation has been quite effective and beneficial. IBM has also used it as part of its planning for business systems (IBM, 1981).

The stages of growth models have been used by King and Teo (1997) to examine the integration between business planning and IS planning. The stages of growth models were also analysed by King and Kraemer (1984) and Benbasat et al. (1984). They attested that empirical support of Nolan's model is not strong and is therefore, inadequate. Even so, Nolan's stage hypothesis was implemented and empirically validated by many researchers (Lucas and Sutton, 1977; Benbasat et al., 1980; Drury,

1983; Farhoomand and Gatehouse, 1988). Moreover, the model was empirically supported by a number of studies, and in which, further stages were included to broaden the area of applicability (Huff et al., 1988; Metz, 1988).

King and Teo (1997) maintained that their literature review supports the application of the four-stage model for the integration of business planning with IS planning such as the following:

- *"Stage 1: Divides planning from administrative integration;*
- *Stage 2: One-way linked planning with sequential integration;*
- *Stage 3: Two-way linked planning with reciprocal integration; and*
- *Stage 4: Integrated planning with complete integration".* (p.283)

The authors said that the strategic potential of IT is increased by each sequential increase, leading to accomplishment of alignment between the organisational plan and the IS plan. The four phases of integration in the context of ten benchmark variables were explained. These signified the theoretical features of every stage. The benchmark comprised for instance, aim of integration, causes for formation of the IS applications, role of IS function, IS executive participation in business planning, and top management participation in the ISP.

King and Teo (1997) noted that the alignment between the organisation plan and the IS plan is supported by the stages of growth model. The benchmark variables were also known as a measure of finding out the integration stage. They observed that the

use of the suggested model could make senior management understand the significance of IS alignment for effective functioning of the IS and accomplishment of the organisation's goals. An empirical study was performed by King and Teo (2000) to assess two modes of information system planning, here described as follows:

- Reactive planning mode, which is development as per the outcomes of previous researchers.
- Proactive planning mode which involves implementation of the four stages of growth model (King and Teo, 1997).

The authors underscored the need for the IS planning tasks to correspond to and be integrated with business planning; otherwise, the effect of the IS in the organisation would be quite hard to support and develop a business value. They noted that there was a higher extent of alignment in organisations functioning in a proactive planning mode of the ISP when compared to organisations functioning in a reactive planning mode. Thus, organisations with proactive ISP modes have greater chances of accomplishing considerable contribution of IS in order to back up the firm's performance.

The correlation between business planning and the ISP with regard to accomplishment of the optimum contribution of the IT on the organisation's performance has been revealed through past research. Moreover, to gain a competitive advantage, the business strategies and the IS strategies have to be simultaneously formed in the same process.

2.6.5 A Critique on the Work of Karpovsky and Galliers (2015): Aligning in Practice: From Current Cases to a New Agenda

Even with extensive literature on IT/IS business alignment, much has yet to be more fully understood about this concept considering its static focus and, little is known about what it is that organisational actors do on a day-to-day basis to align IS and related concerns with business imperatives. Further, analysis of the concept goes beyond distinct macro analysis of alignment processes vis-à-vis the actual micro practices of aligning.

Conceptually, alignment has been given varied definitions by several authors; however, the common argument is that according to Chan et al. (2006), alignment leads to a more focused and strategic use of IT, and that, as claimed by Chan et al. (1997) and Kearns and Lederer (2003), these organisations that are able to align successfully business and IS/IT strategies tend to perform better than their counterparts.

Moreover, there have been arguments that if business strategy is not clear, alignment does not become feasible. Another is the constant changing imperatives in business which therefore call for more agile and vigilant matching of IT assets. Chan and Reich (2007) posited that IT should challenge and transform the business, not simply align with it. Another critical point by Ciborra (1997) is that the alignment literature is too conceptual and does not reflect actual practice. They lack precision, therefore resulting in alignment models being prone to subjectivity (Avison et al., 2004).

Given the arguments presented, the authors argued that alignment research requires greater focus on organisational actors' day-to-day aligning activities, and for them to be able to provide a foundation for further empirical research on alignment practices, they embarked on presenting published empirical cases to identify and classify aligning activities. The end in view was to delineate a set of aligning activities for future research on the mechanisms used by organisational actors to align IS with ongoing processes and strategic imperatives.

A number of process models have evolved illustrating alignment as a dynamic process. At its core is the strategic alignment model of Luftman (2000) who posited, that only when strategic alignment is optimised that it could benefit an organisation, or as viewed by Hurschein and Subherwal (2001), it calls for changing one or more components of alignment through changing some others and occasionally reversing earlier changes. In effect, it should be flexible, ever changing, but reversing a change, if need be. In agreement, Agarval and Sanbamurthy (2002) stated that IT should be used to provide strategic flexibility to the business, with senior executives taking part, especially the CIO. Nonetheless, while these processes are a necessary condition, there still is a lack of a comprehensive multifaceted conceptualisation of strategic alignment.

To fill this gap, Jarzabkowski (2005) extended alignment to be not only what the organisation attains, but also to something an organisation does. Practice then would refer to action or execution. From the extended conceptualisation of aligning practice,

Karpovsky and Galliers (2015) reviewed the aligning literature by presenting activities based on published cases.

Karpovsky and Galliers (2015) pointed out that aligning happens in practice through a set of activities falling into two main categories, namely, tools (aligning as translation and adaptation) and actors (aligning as integration and experience). Tools are a requirement in translating business plans and strategies into IS/IT plans and strategies which involve reconfiguring with the emergence of new governance, structures, or processes, changes in reward systems, or a formation of a new IT organisation, occasionally resulting in outsourcing. The main aligning activity is incorporating new technology into the system. The aim is to evaluate the external and internal environment to anticipate and react to changes, that is, adaptation, with occasional reviewing, clarifying objectives and priorities, adjusting, and measuring business performance.

In terms of actors, aligning can be seen as integration among the units in the organisation. This calls for strengthening ties among organisational actors, then building relationships among users, top management, IT, and business personnel, specifically, the CEO and CIO. Building such relationships may be a product of top management involvement, improved communication, culture change, or training. Aligning as experience would mean negotiating between actors, learning on a more individual cognitive level, then, actual learning and decision making processes with activities revolving around actual actors themselves, making decisions.

The same authors presented a recommendation by Chan and Reich (2007), suggesting for a more holistic treatment of alignment at multiple organisational levels and across multiple dimensions. A reminder was posited in that, organisational practice is more organic in nature, being subject to political and interpretive influences. Aligning activities are interrelated and inseparable in practice. The role of social actors and their actions are imperative. Decision making is central to aligning; it is the core of managerial work. The classic Drucker (1955) principle "*Whatever a manager does, he does it through making decisions*" still applies.

A useful framework as a starting point is a subtle shift of focus from the alignment process to aligning practice, with emphasis on day-to-day activities, rather than abstract phases; from macro to a micro focus on organisational actors and their day-to-day interaction and activities that shape aligning practice, and encouraging researchers to respond by increasing theoretical and empirical efforts with respect to aligning practice.

2.7 Critical Success Factors for IS Alignment

Numerous researchers have concentrated on various features of IS alignment due to its increasing significance. These features include managing information technology tasks to accomplish strategic alignment, managing information as a competitive advantage driver, aligning IS with business strategy, etc. The different research into alignment context and approaches results in a concentration in the area of determining

the aspects which organisations use to effectively integrate their IS with their business strategy.

Early studies of IS alignment with organisational strategy indicated that there is no general term for the variable which could lead to or could impact on the alignment. Terms like key organisational factors, critical success factors, or success factors have been used in the alignment literature. The common term is 'factor', identified to be the most appropriate term for this research. Factor is defined in the Macquarie Dictionary as "*one of the aspects that could lead to bringing about any given outcome*" (Factor, 2014). Factor in this research is defined as any policy, methodology, activity, procedure, or behaviour which an organisation uses, or which exists in the organisation and has been adopted by the organisation to align its IT with its corporate goals.

It is evident from the literature review that there has been a considerable gap in the research identifying the critical success factors of strategic alignment. It was observed by Gutierrez et al. (2009) that in a majority of assessment studies, "*the output strategy is focused on comprehending strategic alignment, and that very few studies have delved on the factors that influence alignment employing the data analysis method*" (p.200).

A model for evaluation and improvement of IS alignment maturity in organisations was designed by Luftman (2003a). A realistic framework as per the model designed by Henderson and Venkatraman (1993) was suggested by the author. The strategic alignment maturity model is aimed at providing organisations the capability to

determine strategic options and methods by which they could enhance integration between strategic business plan and the IS (Luftman, 2000). Key success factors for IS alignment are provided in the strategic alignment maturity assessment tool. The model is also regarded as a vehicle to assess where the organisation stands and where it should be going to achieve and retain business IT alignment.

Luftman and Brier (1999) implemented a five-year research project. This multi-year research (1992–1997) aimed to assist CIOs and CEOs in identifying their personal roles in aligning IS with business strategy and in evaluating the significant contribution of IT in their organisations. Survey, interviews, and observations of more than 500 organisations from 15 industries were used by the authors. The outcome of data analysis is presented in Table 2-5 which includes the six most significant inhibitors and enablers.

Table 2-5: The Enablers and Inhibitors of IS Alignment (Source: Luftman and Brier, 1999)

Enablers	Inhibitors
• IT understands the business.	• IT does not understand business.
• IT demonstrates leadership.	• IT management lacks leadership.
• Senior executives support IT.	• Senior executives do not support IT.
• IT is involved in strategy development.	• IT fails to meet its commitments.
• There are well-prioritised IT projects.	• IT does not prioritize well.
• business/IT partnership.	• IT/business lacks close relationships.

According to Luftman (2000), there are three issues that obstruct strategic alignment. Accomplishment and sustaining synergistic relations constitute the first problem. Sustaining business strategy as the IT continuously develops is the second issue. Lastly, there is the constant need to assess alignment maturity due to the dynamic features of the organisational process.

After performing a continuous study of the strategic alignment field, Luftman further developed the Strategic Alignment Model designed by Henderson and Venkatraman (1993). It was developed into a practical technique through which alignment maturity could be determined to enhance the integration of business and the IT strategy. Over 50 international companies have implemented Luftman's alignment assessment approach. Organisations that are on the lookout for recommendations regarding better alignment of business and the IT strategy could benefit from using Luftman's model.

Alignment is defined by Luftman (2003a) on the basis of these six criteria as follows:

- Communications**:** The capability to share information, knowledge, and ideas between the business and the IT, in order that the organisation's approach, priorities, internal and external environments, and the procedures required for accomplishment of strategic goals are clearly understood.

Certain practices for finding out the extent of communication maturity are considered in Luftman's (2003a) model. The practices or sub-criteria include understanding of IT by business, understanding of business by IT, IT-business liaison staff, leveraging intellectual assets, organisational learning, style, and ease of access.

- Competency/value measurements: The capability to calculate the contribution of the IT and the organisation to the business in the context of comprehending and accepting the business. The measures for finding out competency measurements include business matrices, IT matrices, connection between business and IT matrices, benchmarking, service level agreements, continuous improvement practices, and formal evaluation of IT investments.
- Governance: The process in which authority can make IT decisions that are outlined and exchanged within the management and the capability of business and IT managers to distribute IT resources and prioritise IT.

Governance practices comprise of formal IT strategy planning, formal business strategy planning, reporting relationship, organisational structure, rationale for the IT spending, the way IT is budgeted, the way projects are prioritised, and senior-level IT steering committee.

- Partnership: The relation between the business and IT, including trust level between the two, the involvement of IT in outlining business strategy, and the way each thinks of the other's contribution.

Partnership practices comprise of the role of IT in strategic business planning, business perception of IT, managing the IT-business relationship, shared risk and rewards, business sponsors/champions, and relationship/trust style.

- Technology Scope: The capability of IT to deliver a clear and flexible infrastructure for all, to allow or drive business and IT processes and approach, to

assess developing technologies, and to give solutions that can be customised for the customer and as per internal requirements. The practices for the technology domain include the primary system, architectural integration, standards, and the way the IT infrastructure is believed to be.

- Skills: Include practices like performance feedback, training, providing career opportunities, and encouraging innovation. Skills also include the IT organisation's willingness to change, the ability to bring about new ideas and prospects for learning.

Skill practices are comprised of the entrepreneurial environment, innovation, willingness to change, major IT human resources (HR) decisions, job rotation, and cross-functional training, attracting and sustaining top talent, career crossover opportunities, and social interaction.

The assessment was based on the notion of determining the extent of strategic alignment maturity (Luftman, (2003a)). Thus, evaluation of each practice has to be done on a Likert scale from one to five, i.e., Initial/ad-hoc, optimised, established focus, committed, and improved. The measurement of the maturity level of a criterion is the average of its practices or sub-criterion. Strategic alignment maturity assessment levels are demonstrated in Figure 2-8 (Luftman, 2003b).

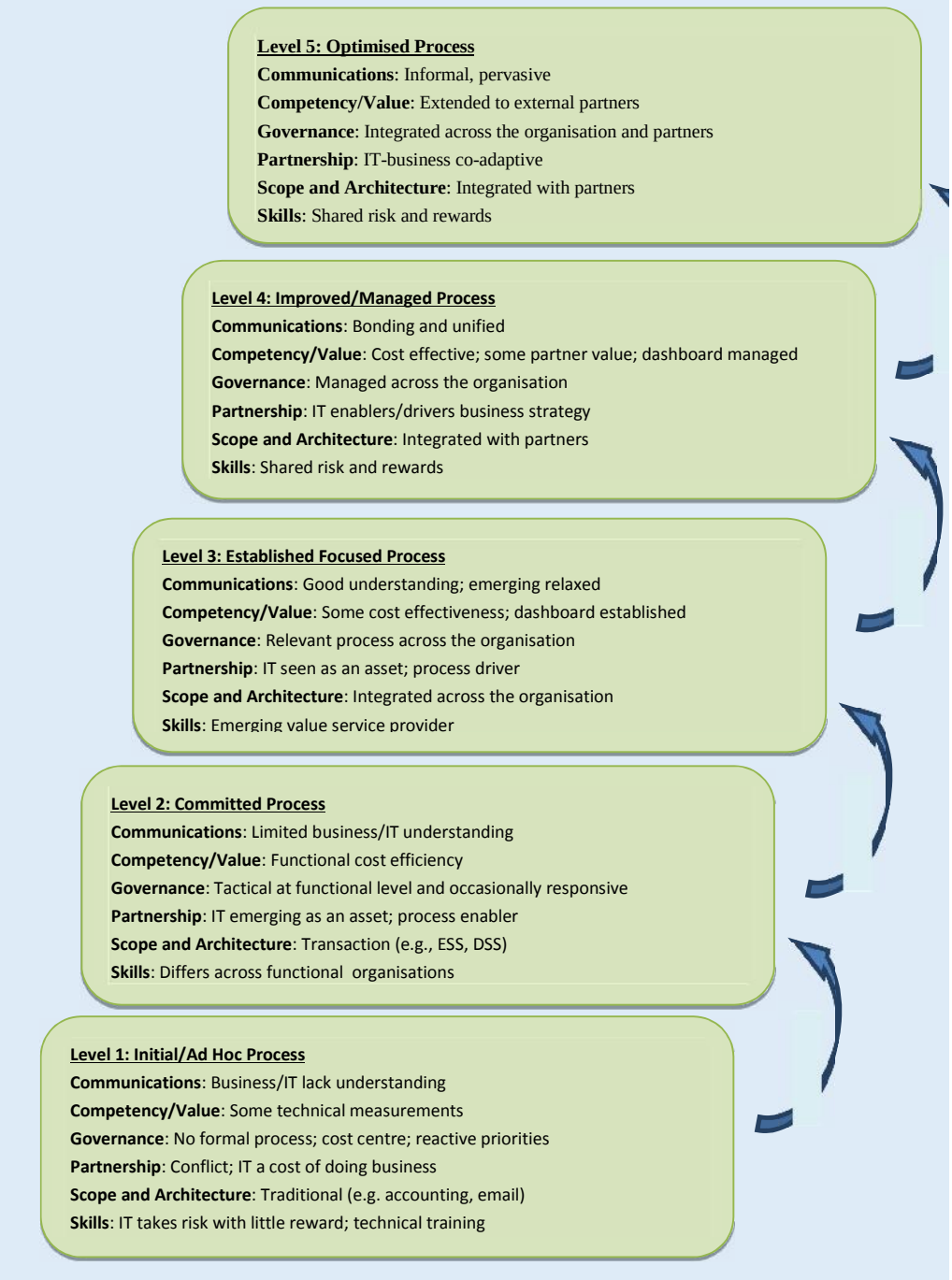

Figure 2-8: Strategic Maturity Assessment (source: Luftman, 2003)

Luftman stressed that there are numerous practices or sub-criteria that have to be evaluated in the Strategic Alignment Maturity Model. Thus, organisations will not be able to accomplish and retain alignment only through a single practice. The organisation now has a road map through the contribution of Luftman's assessment model. It determines strategic choices and opportunities to enhance the relation between business and IT. Moreover, the organisation is able to set particular tasks through the model which helps in ensuring the adequate use of IT as a strategy driver (Luftman, 2000).

The evaluation of an organisation's alignment maturity is not the most significant output from the model, particularly not if the evaluation has been performed for the first time in the organisation, so that alignment could be understood. In actuality, assessment is done to include alignment in the organisation as a dynamic process that is regularly performed to be able to make a comparison between the scores and study the relative progress of alignment (Ekstedt et al., 2005).

Finding out 28 key success factors categorised to 6 dimensions is the most significant benefit of Lutfman's model. Alignment maturity criteria are presented in Figure 2-9.

Among researchers and practitioners, the strategic alignment maturity assessment is quite well-known. For instance, Luftman's model has been utilised by Ekstedt et al., 2005; Silvius, 2007; Gutierrez et al., 2009; Alfaouri et al., 2009; Pedraza et al., 2011; Adaba et al., 2010; Gutierrez, 2011).

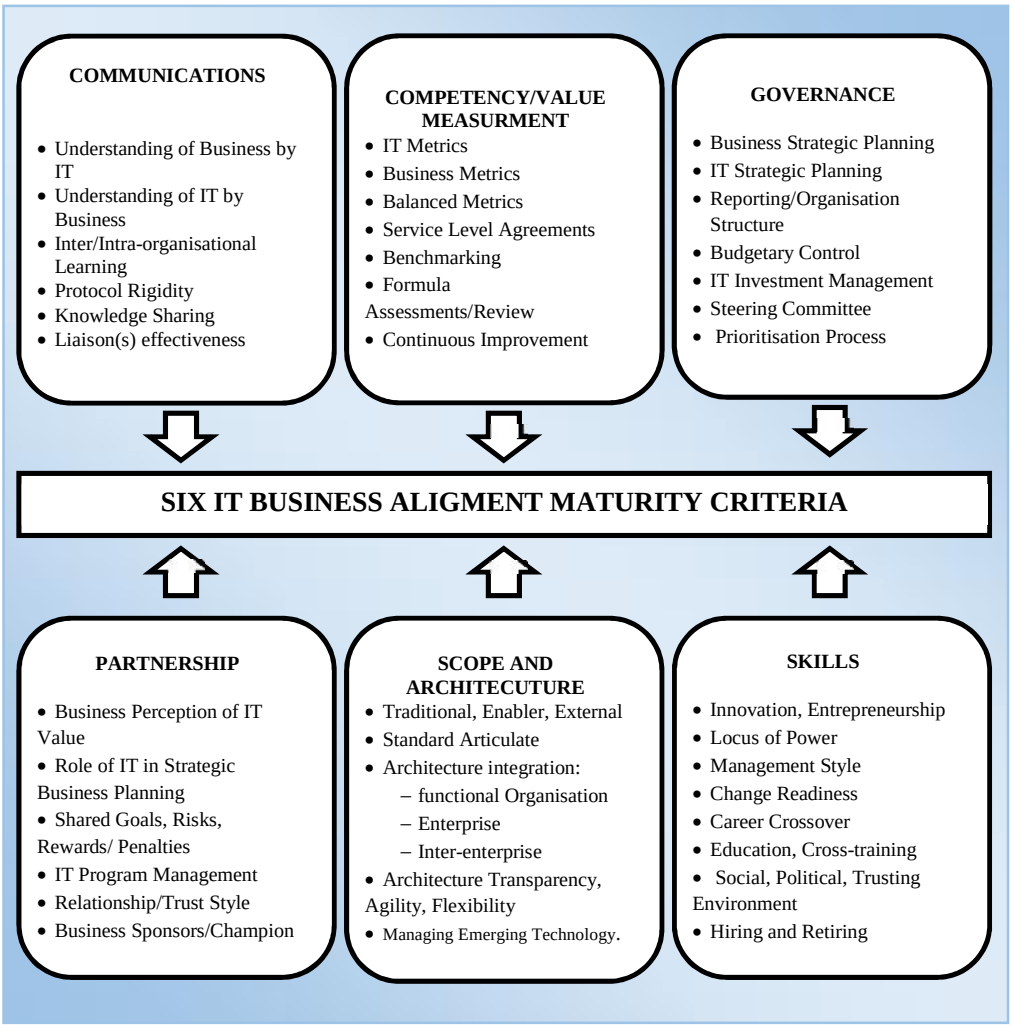

Figure 2-9: Alignment maturity criteria (source: Luftman, 2003)

A field survey was performed by King and Teo (1996) to determine the critical factors that impact on the progress of strategic applications of the IT. The purpose of this research was also to provide guidelines for determining the factors and procedures that could help with or prevent strategic IT development. The authors asserted that

organisational factors could facilitate or prevent IT development. Facilitators were described as follows:

- Factors that positively impact on the organisation's capability to maximise the efficiency of information resources
- Factors that positively influence the organisation's decision to employ IT applications for purposes of strategic planning
- Inhibit factors were recognised as missing factors that form the facilitators.

For the strategic usage of the IT, 57 facilitators were selected from a detailed literature review and classified into seven dimensions as in the following: Business needs, IT drivers, innovative needs, economies of scale, competitive position, top management guidance, and environment. Respondents were divided into two types, as follows: respondents from the company employed strategic information system (SIS); the second type included respondents from non-SIS companies. It stated that "*the IT applications are regarded as strategic if their usage allowed the firm to achieve a competitive edge over competitor firms, or if it inhibited competitors from achieving an edge over the firm, and even included descriptions of different ways in which firms have utilised IT for strategic reasons*" (Luftman, 2003, p.38).

The outcomes indicated that the most significant facilitators include economies of scale, innovative needs, environment, top management guidance, and competitive position. The most significant inhibitors include dearth of innovative needs, no economies of scale, and lack of the IT drivers.

Teo and Ang (1999) sent questionnaires to IS executives in 600 organisations who presented the 12 critical success factors for the process of alignment of information technology with business plans as follows:

- CIOs are well-informed regarding business.
- CEOs are dedicated to strategic application of IT.
- CEOs are confident about the IS departments.
- IS departments are dependable and proficient.
- Users often communicate with IS departments.
- Employees in IS have the ability to be adept with advanced IT.
- CEOs and CIOs are partnering to prioritise applications development.
- CEOs are well-informed regarding IT.
- CIOs are informed about the objectives of the business unit plans.
- CIOs are provided with the organisation's strategic plan.
- The IS departments respond to the needs of users.
- The IS departments are able to bring about innovative methods for the firm to strategically apply IT.

Several factors could be interrelated with others. For instance, the first and the ninth points come under the knowledge domain. This runs parallel to Reich and Benbasat's (2000) contribution. They recognised four success factors such as IT implementation success as a short-term alignment, shared domain knowledge between business executives and IT as a short- and long-term alignment, communication between

business executives and IT as a short-term alignment, and communication between business planning and IT as a short-term alignment affecting behaviour. The significance of strategic business plans and shared domains were emphasised by the authors in accomplishing alignment. They also explained the role of the social domain of alignment when going through the common understanding of the organisation's goals between IT and business executives.

A survey to find out IS alignment with regard to small organisations was formed by Hussin et al. (2002). The authors discovered that the critical success factors that impacted IS alignment include the following:

- IT sophistication that had multidimensional aspects and comprised of information management and IT use. According to the authors, three elements of technical sophistication exist, to name, sources of software, kinds of applications, and targeted decision level. There are five elements of the IT management dimension, namely, an employee with authority over IT, availability of IT staff, number of years using computers, formalised information, technology strategy, and phase of IT development.
- Dedication of the CEO toward IT through participation and involvement. Three methods are suggested by the authors to find out the CEO's commitment toward IT such as the following: their application of IT, their awareness regarding the organisation's software packages, and their involvement in the selection and application of stage for the technologies.

- The kind of recommendations from external experts of IT in the form of vendors and consultants. The authors asserted that small firms rely on the technique of outsourcing to attain the experiences they require.

Baker (2004) observed that the kinds of management styles are a critical factor to attain an effective alignment of IS. Three kinds of leadership have been distinguished by Barker, consisting of collaborative, autocratic, and indecisive leadership styles. When all three styles were compared, the author determined that there was greater degree of IS alignment in firms that were run through a collaborative leadership style.

According to Motjolopane and Brown (2004b), four key factors impact alignment, be it social, intellectual, or realized, and these are as follows:

- Business planning and IS planning integration: This factor indicates significance of the link between IS planning and business planning. The authors stated that if there is a good link between IS and business in the planning phase, it could lead to lesser planning problems, accomplishment of strategic alignment, and clear contribution of IS to organisational performance.
- Rational adaptation in strategic information systems planning (SISP): Rational indicates the practice of the SISP that is known as a formalised and thorough procedure, having a top-down flow and emphasis on control. Adaptation means the presence of regular planning cycles and extensive participation profiles. The authors emphasised that success factors for SISP

include rational and adaptation factors, and in this context, are considered alignment success measures.

- IT managerial resources: This factor seeks to explain the managerial resources needed to effectively leverage value from IT to the organisations. This involves support of top management for IS initiatives and a comprehension of the needs of the business from the IT staff. Authors affirmed that the situation of strategic alignment is affected through the quality of the managerial resources for IT.
- IT implementation success: Accomplishment of alignment is supported through effective implementation of IT tasks. The projects of IT could be from an IT or business outlook.

Motjolopane and Brown (2004) found that the proposed factors by Motjolopane and Brown, to a small or a large degree, could influence each alignment dimension (intellectual, social, and realised). Therefore, the aggregate position of alignment has the possibility of being impacted by these, as well.

The impact of five factors regarding alignment between business strategy and IS was studied by Chan et al. (2006a). The research tested the impact of alignment on organisational performance. The five factors that were analysed consisted of the following:

- Strategic Planning Processes (planning sophistication)
- Shared Knowledge Between Business and IS Executives

- Environmental Uncertainty
- Organisational Size
- IS Department Track Record (the prior IS success)

2.8 Critical Review Findings

As already discussed and presented, the existing body of IS knowledge revealed that many studies have been conducted to enhance the relationship between businesses and IS alignment; yet still, the practical solution has not been fully determined. Consequently, while various studies have been conducted providing details of various theoretical aspects of IS alignment; as yet, no practical work which could clearly and definitely answer the questions as to the extent organisations can effectively achieve the integration between business and IS has been widely available.

A host of related issues also has to be addressed, including a conceptual framework of IS alignment and the precise nature of the effect of various success factors on achieving IS alignment.

The majority of studies undertaken to date are intended to prove the possible benefits which could arise to all types of organisations in adopting IS alignment, notwithstanding the fact that hardly any studies have demonstrated the effect of applying this initiative in nongovernmental, or government SR&D organisations. Another issue pointed out is just how much IS alignment maturity in developing

countries such as the State of Kuwait need to be considered before adopting the IS integration.

Although a majority of conducted studies have collected data from simple survey methods and the like; apparently, there is now a critical need to make empirical studies on understanding the IS alignment challenges and identifying the critical success factors.

Most studies conducted on IS alignment tried to cover the effect of integration at a certain level or part of organisations. However, this has been misconstrued that the challenges in IS alignment are restricted to only one domain of an organisation. Conversely, this is not the case in the real context. Instead, the issues are a part of the various aspects of the strategic, technological, organisational and environmental domains.

In summary, the issues about the adoption of IS alignment call for greater attention from us. These challenges need to be investigated in the light of a coherent framework that is developed based on the literature review findings.

The existing gap that has been identified will be filled in by conducting an empirical study in order to understand all aspects of the research problem in SR&D organisations. All these would help motivate and encourage organisations, and in this context, scientific organisations to achieve IS alignment.

Based on all the aforementioned discussion, recommendations are put forward, as follows:

- More empirical research is imperative.
- IS alignment research needs to incorporate more aspects and uncertainties in the studies undertaken so that the outcome can cover varied domains such as strategic, technological, organisational, and environmental factors.
- A comprehensible framework has to be developed on how IS alignment would be achieved.
- A more extensive and exhaustive study of SR&D organisations in developing countries, other than Kuwait, to include the Gulf region is called for. This would provide scientific managers a deeper look at preparing their organisations' strategic plans aligned with their IT and business goals.

2.9 Conclusion

This chapter underlines the issues about multiple aspects of IS alignment. Relevant studies were identified, which dealt with practical solutions about achieving IS alignment. It is worth noting that as yet, a dearth of empirical studies concerning IS integration in SR&D exists. This chapter has also presented a comprehensive historical evolution of IS alignment models, to include a critique of the models discussed. In

addition, the chapter has reviewed the relevant literature in order to understand all the factors that could affect the success of aligning organisational strategy with IS.

After a thorough discussion on the related studies on IS alignment, its varied definitions, and evolution of IS alignment models, this researcher has come up with a methodological approach to achieving IS alignment and adoption of a proposed conceptual framework from a multidimensional perspective. Several theories from renowned and respected IS experts have been used, specifically adopting the contextualism methodological approach of Pettigrew (1988) to derive a working model befitting SR&D organisations, particularly, the case of KISR, a multidisciplinary scientific institute.

Chapter 3: Conceptual Framework

3.1 Introduction

The aim of this chapter is to develop a conceptual framework for investigating IS alignment within an organisation. The chapter begins with a discussion of the methodological approach to IS alignment implementation and adoption. Pettigrew's (1988) contextualism methodological approach was adopted as the basis of a theory for constructing the framework. Pettigrew's contextualism approach is believed to be a fitting model not only for KISR, being involved in several scientific disciplines, but also for organisations of similar nature in Kuwait and in the Gulf. The three dimensions and their elements are identified and described. The Context dimension is discussed in the beginning, as well as the elements for this dimension, which are structural, cultural, and political aspect of the organisation. Then, the dimension content and the key drivers are explained. The roles of top management, IS managers, and the planning and support team in the organisation are discussed. The third dimension 'process' is then explained. Integrating these three dimensions, namely, context, content, and process is needed to incorporate all the relevant factors identified in the literature review that pertain to strategic alignment. Further, it is a way of synthesising this literature into a useful and usable diagnostic framework, toward investigating and analysing a strategic alignment problem in an organisation, such as

that of KISR. Finally, a discussion on the development of the research conceptual framework follows.

3.2 Methodological Approach to IS Alignment Implementation and Adoption of the Conceptual Framework

The best practices to achieve IS alignment require introducing fundamental changes to the organisations. Hence, it is vital to recognise complex issues and dimensions across the organisation. Managerial, technological, cultural, and policy-related organisational changes are likely to be incorporated in these issues. Pettigrew (1990) argued that a study of organisational change requires an understanding of the emergent, situational, and holistic features of the process in its context. Oppl (2016) had this to say in relation to how changes to business processes affect people at work and interaction with forces/factors within and outside of the organisations. However crucial these factors may be, he claimed that flexibility and adaptability to the everchanging business trends are imperative among organisations.

> *"Changes to business processes have an impact on how people work and collaborate within organisations. Being able to quickly adapt business processes to external or internal influencing factors is crucial in the present ever-changing business environment" (*p.1*).*

Kritsonis and Student (2004) articulated that in order to study organisational change, the many theories and models that have evolved over the years, like Social Theory,

Reasoned Action Theory, and the Systems Theory should be examined. Considered to be the earliest and the most widely used theory of organisational change, the contextualism methodological approach has been developed as an analytical tool, so that the analytical and field work of the research study may be effectively undertaken.

While working at the Centre for Corporate Strategy and Change (CCSC), Warwick University, UK, Pettigrew developed the contextualism methodology in the mid-80s. A diversified group of experts constituted the team, working on a designed strategic change and an investigation of efficiency across organisations under the CCSC research program. This particular program consisted of over a hundred organisations from both the public and private sectors from eight businesses (Pettigrew, 1988; Pettigrew et al., 1988; Pettigrew and Whipp, 1991). It was ultimately determined that there should be a framework of study, which can integrate several studies with diversified aspects for a proper investigation of organisational change. The content and context of change and its process, accompanied by their interconnections, can be established by the realistic and theoretically sound studies on organisational change (Pettigrew, 1990; Pettigrew and Whipp, 1991). To study the dynamic contact between the organisational change variables and the nature of change, the contextualist approach and/or Context, Content, and Process (CCP) framework could provide a holistic view (Pettigrew, 1987, 1990; Child and Smith, 1987; Clark et al., 1988; Dawson, 1994).

Considering the complex dimensions and the constant changes in the organisations, the core aspect is to have a formal strategic planning procedure or a formal

documented plan, and a well-defined business strategy. This is in concurrence with the challenge posited by Chan and Reich (2007), that in order to allow adaptation to the constant changing business processes, not only should IT confront and transform the business and aligning with it, but more importantly, to develop a "more agile and vigilant matching of IT assets"; meaning in that, a procedure that is responsive, yet cautious to whatever repercussions may arise in view of the complex issues confronting the organisational environment. Elucidating further, according to Pettigrew et al. (1987), the contextual forces are considered within the social, national, economic, and political contexts, and within the understanding and analysis of actions pertaining to organisations at the national level (the outer context). Comparatively, the internal (inner) context is illustrated by culture, organisational strategy and structure, and management processes. Dowson (1996) put it across from another angle, i.e., national competition, change in the competition strategies, social expectations, government laws, and technology innovations are referred to as external factors. In contrast, technology, human resources, administrative structure, and services or products of an organisation are assumed to be the internal contextual factors. The main features of the contextualism framework are demonstrated in Figure 3-1.

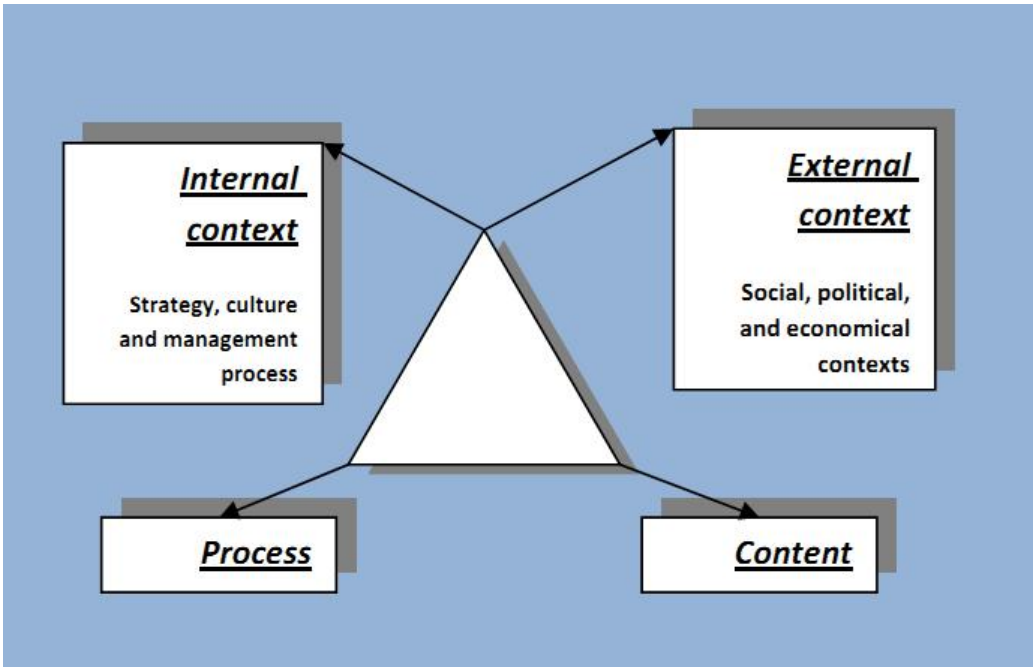

Figure 3-1: The contextualism approach framework (source: Pettigrew et al., 1988)

Pettigrew (1990) stated that the contextualism approach can be expounded on the basis of four statements as follows:

- In multiple dimensions, organisational change should be analysed from the perspective of its influence, the structure, and departments of the organisation. The actions of individuals, groups, or departments are examined at diverse levels to accomplish this activity.

- The organisational change is about capturing the reality of organisational actions and proceedings, since the existing and upcoming aspects of the future are to be formed through this process. This particular phenomenon is defined

as the temporal interconnectedness of events. The rate of change in an organisation is affected by the human resource legacy if the major variation in the knowledge is to be required by the change. Therefore, chronology and events are not merely the case, but also the strategy, underlying reasons, and logic of the changes that are to be explored for significant implications.

The role of action and context collectively form the third assumption. Context is not only viewed as an environment but recognising, learning, and facilitation of particular understanding of key stakeholders or actors in a shaping context. The process of change is understood by the key stakeholders. Desirable outputs are accomplished through dynamic contributions.

- A single theory cannot be employed to study the change process. Organisational phenomena are believed to be dynamic processes, since they have numerous motives. Many scholars claimed that change should not be conceptualised as a simple, easy, and linear activity. According to Pettigrew (1997), five distinctive factors are contained in the holistic change process across organisations, which are operational change and managing strategy, human resources, environment, leading change, and coherence. The factors should not be separated and are interrelated (in a loop instead of a linear sequence).

There is currently a clear trend toward complexity-based organisational strategy. Emerging research supports the fact that moving from a linear to a non-linear complex

model of the organisational environment will help managers to lead a more profitable organisation.

The three dimensions of content, context, and the process of the contextualism methodological approaches are reviewed in the following sections in order to adapt them into the field of IS alignment. The definitions and key concepts of the three analytical approaches are discussed in this review along with discovering main features and attributes of these approaches. Furthermore, the relationship between the contextualism methodological approach and the main domains of IS alignment and the key success factors are identified. The proposed research framework as a whole is then thoroughly described.

3.3 The Context Dimension -The Why

The *"surrounding associated with phenomena"* is described as a context (Cappelli and Sherer, 1991 p. 56), the success or failure of any organisational change is evaluated by these surroundings, and it can be understood that context might act as an impeding factor that makes conversion to the required attitude or/and behaviour within organisation, or context considered as a change facilitator (Johns, 2001). The elements and triggers required to affect the change process and content are also referred to as context (Pichault, 2007).

Armenkis and Bedein (1999) specified a parallel opinion of the context factor role as that which

> *"Focuses on forces or conditions existing in the organisation's external and internal environments. Two types of conditions form the context in which an organisation functions: external conditions which include such factors as governmental regulations, technological advances, and forces that shape market place competition; internal conditions, which include the degree of specialisation or work specificity required by existing technology, level of organisational slack, and experience with previous change" (p. 295).*

The contextual themes are investigated to explain the change acceptance and resistance to change. According to Johns (2001), even irregular mediation or events can be investigated on the basis of their situational factors:

> *"The most compelling illustration of why to pay attention to context resides in its capacity to explain anomalous organisational phenomena" (p. 4).*

Moreover, absorptive skills along with flexibility could be accomplished through considerable evaluation with the help of context, if organisations strive to develop their capacity and flexibility to embrace change (Klarner et al., 2008).

The context dimension contains two levels in the contextualism methodological approach, which are the 'inner context' and the 'outer context' of the organisation. The culture, structure, and the organisational politics are included in the inner contextual level. In the formation of organisation plans, each of the factors has direct or indirect impact in the execution of the process. The elements such as the business,

economic, social, and political setting of the organisation are integrated in the external contextual level (Pettigrew, 1990).

3.3.1 Organisational Structure

Both the diverse structures created by the composite actions of individuals within an organisation and the prescribed framework of relationships collectively shape the structural features (Pettigrew, 1990).

In this process, the responsibility relationship is split up, and that which integrates a framework with its effective coordination is described as the organisational structure (Strens and Dobson, 1994). According to Jackson and Morgan (1982), organisational structure is defined as:

> *"The consistent work actions developed through the comparatively stable distribution of managerial tools and roles, and it enables the organisation to perform, direct, and manage its work accomplishments". (p.81)*

According to Hill et al. (2012), the organisation becomes administrative and more official with its rapid growth, which means that they emphasise significantly on developed procedures and possess a strong structure of guidelines. Employee management can be effectively controlled, since the job descriptions are properly defined in the formal structure.

In the context of IS alignment, several research studies have highlighted the importance of IS organisational structure and structural alignment (Henderson and Venkatraman, 1993; Luftman and Zadeh, 2011; Chan, 2002; Cram et al., 2015; Hu and Huang, 2005; Galliers et al., 2012). According to Adaba et al. (2010), executives and top management usually perform decision making without the involvement of lower hierarchy, especially in a centralised organisational structure. The desirable IT-based milestones can be accomplished by the development of the IT plans and a clear business with the involvement of concerned stakeholders at all levels of the organisation. The lack of this strategy is likely to stop the alignment. According to Chan (2002), the informal structure cannot be completely isolated from the formal organisational structure since the socio-technical systems of an organisation can be brought together (i.e., people, jobs, procedures, expertise, information, and structures). Generally, many informal structures, procedures, and connections are involved for the achievement of tasks, such as communities of practice, social networks, unofficial agreed-on processes, cross-department relationships, flexible allocation of tasks, and so on. Outcomes are described by the author such as the following:

- No single right way;
- diversified structural alignment;
- importance of the IS flexibility;
- IS strategic alignment, being of more importance than formal IS structural alignment;

- structure is a means to an end;
- the informal structure of an organisation is more imperative to IS alignment than normally acknowledged;
- More focus is required in the alignment of the informal structure, and robust business culture may be a prerequisite to an informal structure through which proper design is encouraged.

3.3.2 Organisational Culture

Strategic IS alignment initiatives have been thoroughly examined by many researchers. According to their analysis, culture plays a vital role along with several other aspects in affecting the initiatives. There exists a fragmentation of the processes and development of the IS when taking the aspect of culture into account. The influence of culture and the influence upon culture must both be analysed (Kappos and Rivard, 2008). Hence, keeping this aspect in mind, the development, processes, an IS, and culture have all been integrated into a model by these researchers.

Nickels and Janz (2010) have expressed that since the 1980s, one of the key management issues relating to strategy making is organisational culture, and the management-based literature are heavily crowded with this particular matter. Particularly, one perspective is that organisational behaviour is thought to produce the organisational culture.

The attribute of culture is composed of a set of relations, values, and beliefs which are involved in formulating different activities in an organisation. It also includes the rules, codes of conduct, and languages which notify these activities (Pettigrew, 1990). Organisational culture has been defined by Hofstede (1998) as a set of programs in the mind that discriminates individuals belonging to different organisations. Schein (2004, p.6), a renowned scholar in the field of organisational culture, defined organisational culture as "*the innermost layer comprising basic assumptions and beliefs, which are common to individuals working in an organisation influencing their unconscious behaviour and which determines how the organisation views itself and its surroundings*". This view is however taken for granted.

Schein (2010) identified three abstract levels at which the framework of organisational culture works. These are the following:

- Artefacts – They serve to be the uppermost level which comprises observable structures and activities of the organisation.
- Espoused Values – They involve adopted justifications like philosophies, goals, and strategies of the organisation.
- Fundamental Assumptions –- They comprise the innermost level and include views, beliefs, feelings, and beliefs, which are taken for granted.

This framework proposed by Schein has been used by Hill et al. (2012) who asserted that organisational culture comprises all the matter present in the minds of members of the organisation. This matter is used by these individuals not only to construe what is

going on around them, but also to respond to these happenings, even if they do it unconsciously. Making Schein's framework of organisational culture simpler, Hill et al. (2012) presented a model which divides organisational culture into three layers for comprehending and analysing them. These layers of organisational culture are present in all organisations, and can be used to assess and construe activities executed by the individuals of the organisation when IS enters the organisation. These layers are the following:

- Explicit –– It involves all those aspects which can be observed, as one interacts with the organisation for the very first time, like building, language used by organisational members, etc.
- Norms and values –- Unique set of norms and values are held by all organisations. Norms generally refer to the society's rules determining what individuals must do or what they must not do. Values, on the other hand, can be considered significant, as well as insignificant. It is something experienced by inward feelings or thinking which is non-negotiable.
- Assumptions and beliefs –- They comprise the innermost layer of the organisational culture representing what is believed by organisational members.

Several theories have been presented regarding the analysis of IS and its effect upon organisational culture. It is an extremely complex and contested subject, which is why several theories have been brought forward. In one example, an IS has been implemented in an integrated manner within a large UK university, and this

implementation has been analysed by Waring and Skoumpopoulou (2012) through a longitudinal case study. In 2006, the Student Information and Technology Services (SITS) system was first applied in the university. The purpose of the research was to thoroughly understand the cultural change which came about after the implementation of the SITS. Individual professionals, like corporate or administrative, corporate, departmental levels have been created to analyse the cultural change. The interactions between the system data, technology, and organisation have all been studied within the UK University. The data for the research were collected through interviews, participant analysis, and document research.

In order to present a wide depth of understanding, the authors presented 3 perspectives of differentiation, integration, and fragmentation. Culture is not static, which is why the results cannot be reported. The SITS implementation affects culture at many levels, which is why the pattern changes over time. Meyerson and Martin (1987) presented a perspectives approach which has been used to present further analysis. Table 3-1 illustrates an analysis of culture manifestation from three different perspectives.

Table 3-1: An Analysis of Culture Manifestations from Three Different Perspectives

Culture Manifestations	**Integration**	**Differentiation**	**Ambiguity**
Certainty/uncertainty	Departmental level data collection and use were present before SITS. Strict rules and central integration were	The requirement of SITS was not explained to the academics or the departments. The reason behind	Poor working relationships have been formed due to levels of uncertainty, the relationship

Culture Manifestations	Integration	Differentiation	Ambiguity
	achieved after SITS implementation. A standardised data collection and storage program are to be followed by SITS. Reports can only be developed by the SITS team.	selective training of administrative staff was also not stated. The SITS access has not been given to academics. Why is that? It is considered a complicated system.	between administrators, schools, centre and academics have been affected.
Loss of trust	The academic work was performed by the working staff collectively before the application of SITS and the SITS team.	Initially, the SITS data were inaccurate. Hence, the administrative staff and academics lost trust in the new system.	The SITS rules have been challenged and questioned by the academics.
Work around the system	Data manipulation was done by departments, and work was done through their systems before SITS was introduced. The data are presented in the required format when SITS is used.	The business is done using parallel systems as required by the department findings. For instance, the standard degrees, placements, etc.	Individual systems were set up by each of the academic staff. Informal channels were used by some of the individual accessing SITS data.

Culture Manifestations	Integration	Differentiation	Ambiguity
Difficulties working together	Teamwork was present within departments, and issues were not evident before SITS application.	Issues were created, tension increased as new jobs were to be learned after SITS implementation. Hence, there is now tension between administrative and academic staff.	The pastoral roles of the academics are trivialised, which is why they are disengaging from the university.
New power/politics	Central control systems are applied within departments after SIT implementation and before it was based on academic student matters.	Around SITS, there is the presence of a new power base within administrative function. For instance, efficient housekeepers, the SITS team.	Many were isolated, and there was loss of individual academic power upon the student affairs.
Identity change	Academics were supported by academic staff before SITS. They are now regarded as the SITS people. A new culture of SITS has come forward.	Due to SITS, the academic identity has changed as well as student support. The university function requires a SITS team.	SITS affects individuals as some of the staff gain new titles or several leave the university.
Technological discourse	The SITS staff uniquely shares new sets of jargons and discourse. This	The impact of SITS is placed upon academics, but they do not share it.	The administrative staff also does not share the SITS

Culture Manifestations	Integration	Differentiation	Ambiguity
	is departmental as well as central.		discourse and may discriminate.
Structure/re-structure	The departments are required to apply the SITS requirements as part of their structure.	To manage effective SITS implementation, several internal management structures were developed.	Perpetual flux was felt by many of the staff members since the implementation of SITS.

The aforementioned analysis indicated that the applied approaches have not been able to present a clear understanding of the cultural study complexities. The integrated IS environment is complex, which is why it was not possible to present a clear view. Hence, the 'cultural kaleidoscope' as a heuristic was presented by the researchers to cope with the inefficiencies. This heuristic perspective would help understand the cultural change and its effects to a certain extent. Hence, during the implementation process, only specific incidents would be stated, and the obvious cultural trends would be analysed by the researchers.

As mentioned above, Meyerson and Martin (1987) study revealed the close relationship between organisational culture and information systems. Table 3-1 indicated the existence of several types of organisational culture, and the importance of identifying the type of culture prevailing in the organisation enhances the success of information system alignment processes. Moreover, any management change

would affect a type of the organisation culture, and would also require a change in the method of action aimed at enhancing information system alignment in organisations.

As mentioned before, in the context of IS alignment, it has been asserted by Chan (2002) that the informal structure of an organisation holds greater importance for acquiring alignment as compared to what has been accepted earlier. She elaborated it as the third and probably hidden part of the alignment. Organisational culture is perhaps the most suitable attribute which points toward the nature of informal organisational structure. The assertion made by Chan actually indicates the likelihood that the culture of an organisation serves to be a moderating factor in the acquisition of IS alignment.

While investigating the possible association between organisational culture and IS alignment, the first step may involve identification of different attributes of organisational culture that might have a link with this issue. Owing to the fact that the notion of 'fit' is central to the concept of IS alignment, the degree of congruence demonstrated by managers and executives for the dominant form of organisational culture existing in an organisation can prove to be beneficial for this investigation. In particular, as a reflector of informal structure of organisation, evaluation of this level of congruency in organisations can assist comparative analysis of the extent of IS alignment acquired and the informal organisational structure.

In a recent study, researchers have analysed the association between level of congruence in the opinions regarding the dominant organisational culture and the level of maturity in strategic alignment as viewed by the organisation. As per the findings

of the study, there exists a significant correlation between the degree of congruence at executive level regarding dominant organisational culture and the degree of maturity in strategic alignment in the selected companies. It was found that the companies with highly congruent cultures demonstrated greater maturity in strategic alignment (Nickels and Janz, 2010). There are two implications of the findings of this study for management of IS. Firstly, there is a possibility of a third aspect of the acquisition of IS alignment, i.e., congruence of organisational culture. Secondly, there is a requirement for further studies to be made for exploring this link between organisational culture and IS alignment in order to bring about improvement in IS alignment.

It has been proposed that organisational structure, culture, and technology should definitely be considered while devising any strategy for change management. Although the association between IS alignment and organisational culture requires further exploration, researchers are of the opinion that the main problems of organisational integration take place at the micro-level.

3.3.3 Political Aspect of Organisation

Political activities in an organisation involve differences regarding distribution of power as well as conflicts of interests among different internal stakeholders of an organisation. Scholars of organisational concepts have put forward a number of different descriptions for political components of activities which are formal as well as informal, legitimized,

as well as non-legitimised, emphasising the exploitation of influence and power or on the development of relationships.

Power has been defined by Salancik and Pfeffer (1977) as the capability of accomplishing different tasks in a desired way.

Meanwhile, organisational politics has been defined by Pettigrew (1973) as the aspect which involves exploitation of power to affect the process of decision making. He added that organisational politics is a relational notion that is created and sustained in an organisational environment, as well as in its relations with others. Organisational politics is only possible with the ability to produce required organisational outcomes which can be realised through demonstrating awareness, possession, control, and strategic utilisation of power sources. According to the political-bureaucratic model of organisational decision proposed by Pettigrew, individuals involved in decision making hold different positions in the organisational hierarchy, and these individuals mostly cooperate or compete in a political activity. Powers possessed by each of these individuals make sure that some particular objectives are established, and efforts are made for achieving them.

The concept of the circuit of power has been brought forward by Clegg (1989). He stated that power is a circular process which flows into 3 channels, and each of the channels has its own dynamics.

- The episodic agency circuit

This circuit is considered simple where the power is exercised by the human being based on traditional concepts. The traditional concept is that resources and means are activated by A which influences B in a manner which would not occur unless it has these relations with A. Within this circuit, the A and B relationship is clear. However, there is no information regarding the context, the A and B operation field, as well as the influence of this field upon the use and accessibility of power resources. These issues have been covered by the social and the systemic economic circuits of power.

- The social circuit of power (the circuit of social integration)

The membership, meaning, and belonging rules, as well as their relations are presented by this circuit.

- The systemic economic circuit of power.

This circuit is also considered abstract where material, as well as nonmaterial resources are formed. This circuit is also known as the circuit of system integration.

Within the theory of power, the analysis of circuits of power are extremely essential. The simple circuit has the ability to present the real act of power. The second and third circuits provide the field power description along with the limitations and the advantages. These two circuits are considered to be contextual and complex, as the power relations are conducted in a complex manner. The most efficient power is the one which does not require any form of struggle against the rules or any kind of special resources to achieve the goals. Power relations are expected to be complex which is

why they are observed as unpredictable, and their effectiveness is lowered. Industry and government organisations have applied the circuits of power framework to IS cases (Introna, 1997; Silva and Backhouse 2003; Backhouse et al. 2006; Fragos et al. 2007; Silva 2007; Lapke and Dhillon 2008).

A strategic approach to power relations has been presented by Clegg's circuits of power for power theory. Within this theory, there are fields with all open possibilities, and none of the sides would be able to maintain advantages or fixed sides as time passes. An environment which is dynamic requires complex resources and presents opportunities of change that are permanent. It also allows the incorporation of new groups into power relations.

Within this dynamic environment, Henderson and Venkatraman (1989, 1993, 1999) outlined a range of interlinking strategic options which managers should discover. Termed as the SAM, the proponents hinted on organisational transformation and exploitation of the IT competencies as the organisation competes with the changing environment. They emphasised on the four domains, namely, IT strategy, business strategy, IT infrastructure and processes, and organisational infrastructure and processes, each having its fundamental dimensions and power features, demonstrated through integration of business and functional domains and strategic fit, interlinking between internal and external elements.

When people are resisting power in a successful manner, the organisation must have proven to have the rarity of effective resistance, inferring for the organisation a certain degree of importance and reputable standing.

Also, the three circuits prove to be an efficient tool for the degree of power evaluation when the resistance process takes place. This evaluation is hence divided into 3 parts. The first part is the outcome process which is presented in the overt circuit. The second part is the inner ability questions which are formed during the process course and help develop the social circuit. Lastly, the actual resources questions regarding the process availability which occur with the help of the systemic economic circuit.

A general description of politics has been put forward by Mintzberg (1983, p.172) according to which politics is "*a behaviour demonstrated by an individual or group of individuals which is informal, presumably narrow minded, particularly discordant and more importantly unauthorised, i.e., having no approval from formal authority, certified expertise, or accepted ideology"*.

While elaborating politics in an organisation, Mintzberg (1985) has associated conflicts and politics. He stated that there are three aspects of organisational conflicts, namely, stability, pervasiveness, and intensity. These aspects are linked with four kinds of political platforms which are confrontation, unstable alliance, politicised organisation, and absolute political arena. Furthermore, organisations are made to plunge into and out of all these kinds of political scenarios or systems of influence. According to him, 13 different political games are played to deal with the resistance,

establish a power base, set back a competitor, or bring about change in the organisation.

These political games give rise to three different kinds of stimuli which result in the development of a political platform. These stimuli include change in basic setting of the organization; damage to the practiced hierarchy of power; and pressure from involved actors to align the coalition again or alter the setup. His proposition is based on the concept that conflict should be controlled and restricted, else the organisation would surrender to political pressures.

While asserting on the functional role of organisational politics, Mintzberg (1985) proposed the following:

- A number of organisational deficiencies and malfunctioning can only be rectified through organisational politics.
- Open and comprehensive debates on different issues are promoted by politics.
- Politics allows reorganisation of alliances and modifications in power distribution.
- Decision making can be positively affected by politics.
- Politics may allow improvement in leadership through promoting the most efficient and strongest individuals of the organisation to a position of higher authority, just like Darwin's survival of the fittest.
- Politics may hasten the death of a weakened organisation.

- Important organisational changes which are hard to realize in the legitimised system of power can be realised through politics.

It has been argued by Child (1972) that analysis of the position of an organisation followed by setting up organisational objectives is shaped by the ideology of those who possess powers. The theoretical model of strategic choice proposed by Child indicated that the study of strategic management has overlooked the political process. According to Child, the investigators have not taken into consideration the effect of power holders in companies. In fact, this is a very important scrutiny since the rest of the research studies carried out in strategic management can be regarded as incomplete or invalid, if they also demonstrate this negligence. In other words, these reports might become invalid as they ignored the fact that individuals possessing power have strategic choice of setting up a particular organisational structure, modification in environmental attributes, and the choice of determining standards for efficiency.

In comparison with the aforementioned scholars and their descriptions of organisational politics, Drory and Romm (1988) stated that there is not any single definition which encompasses all aspects of organisational politics. However, the available literature contains a hierarchy of definitions ranging from highly specific to general descriptions of activities influencing the company that can be formal or informal.

Distribution of power in an organisation can be vertical or horizontal, and power structure can influence activities of individuals who hold more power than others,

especially their decision making. According to Chang et al. (2009), organisational politics is far-reaching and influences not only the efficiency of employees but also other aspects of the organisation like resource allocation. Political activities of employees are determined by the conditions of the workplace, work, and personal, as well as organisational targets (Danish and Bodla, 2009). More importantly, organisational politics can prove to be beneficial if utilised with good intent and for the realisation of organisational dreams. Bolman and Deal (2008) have pointed out that certain groups are more close to decision makers, and they can exploit this access. Bodla and Danish (2009) emphasised on the significance of politics in an organisation by stating that it influences different employees in different ways. The outcome of organisational politics is damaging only when it is misused. Moreover, employees who are aware of beneficial aspects of political activities respond to them less harshly. For that reason, members of an organisation should comprehend the significance of organisational politics.

Prior to elaborating the integration of information systems in a business strategy, it is important to examine the state of politics and power in organisations. Power is not an isolated characteristic of an organisation. There has been substantial debate on the concept of organisational politics and power.

Three theories of resistance to the IS implementation had been evaluated by Markus (1983) in her seminal work entitled “Power, Politics, and MIS Implementation”. Person-based resistance relates to the internal factors of the organisation having links with individuals involved in the IS project. Systems-based resistance is brought about

by factors linked with efficiency and functionality of the computer-based information system. Lastly, interaction theory explores the nature of association between the system and perspective of utilisation, specifically, the political differences which emerge owing to the nature of interaction. The empirical research of Markus (1983, p.441), demonstrated that the most significant implication of interaction theory is that, "*it is an exhaustive analysis of the organisational environment and processes, in which the system would be installed and operate, which can allow formulation of the most suitable recommendations for the specific design of system and strategy for implementation*". It is worth mentioning that during this organisational analysis, evaluation of technical systems should be supported with political or social analysis. Additionally, while the project participants are planning for installment and designing of the system, evaluation of interests, motivations, remunerations, and power distribution can prove to be helpful in comprehending the response of organisational members.

In the context of an integrated IS, Markus (1983) reached the conclusion that the implementation of integrated operational IS has closer links with factors mentioned in the interaction theories, i.e., political variables. Evaluation of these variables allows prediction and comprehension of different happenings related to the establishment of MIS in organisations having complicated structures, i.e., comprising a number of different subunits involving several users.

This "political" perspective of interactions that take place between the system, members, and the context of use has resulted in a study of factors linked with the match

between the firm (culture, structure, social network) and any suggested integrated IS format that could strengthen, weaken, or modify the present status quo. This could be referred to as the "organisational validity" of an IS. This trial of theorising the "human" aspects of application was innovative in the context of computing/IS literature at that time and even led to certain perceptive work into what some could refer to as the dysfunctional behaviour of organisational actors; while some could consider it as completely normal and also beneficial (Alvesson and Willmott, 2012).

The context in the contextualism methodological approach in this research may be stated as IS challenges. The perspective of IS alignment includes challenge factors so as to incorporate IS strategy with business strategy. The context elements for the suggested IS alignment framework is summarised in Figure 3-2.

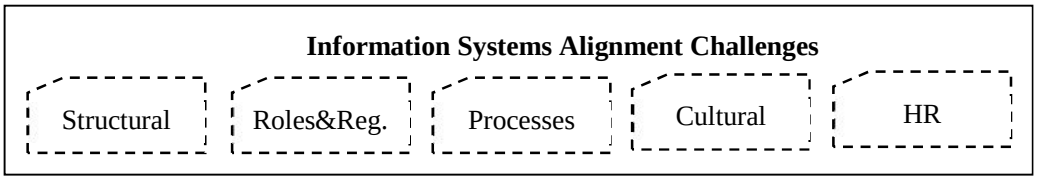

Figure 3-2: The context components for IS alignment framework

3.4 The Content Dimension - The What

Content according to Pettigrew (1990) means what in terms of change or the aspects and areas of transformation that are being analysed.

Walsham and Pettigrew (1993) stated that the IS strategy content is an idea for change. In this regard, the content dimension is regarding the changes that have to be brought about in the organisation. It includes strategic modifications to certain factors of the firm like business procedures, organisation structure and roles, technology, corporate culture, and services and products. As explained by Walsham (1993), the idea of change incorporated in the IS strategy seems to be essentially taken from intrinsic knowledge, be it through planned design or a growing phenomenon. Thus, it is too complex a matter to be contained in a set of logical assumptions and procedures, as is presumed in the IS literature.

The main perspective in the IS field presumes that the main elements and orientation of the IS strategy is stated in the content dimension. These include scope, aim, rules and plans, and architectures (Earl, 1989). The scope defines the series of particular kinds of IS included in the strategy. The objectives can be exact and quantified. They include the targets determined for the IS function and the connections between business aims and these targets. There are three sections in the architecture element as follows: (1) systems architectures could be regarded as the centre of the IS strategy. It defines the application portfolio that has to be applied in the firm; (2) is the technical architecture regarding the IS infrastructure, meaning, hardware components to back up the IS strategy; and (3) is the organisation architecture which outlines tasks and duties linked with the execution of the IS strategy. Rules comprise guidelines and procedures that help in taking decisions. Lastly, directions for the IS projects, priorities, and budgets are included in the plans.

A close study of the aforementioned perspective of the IS strategy's content shows that it is widely accepted in the IS literature, and it considers IS strategy as logical implications and procedures. Thus, it tries to objectively describe the formal elements of IS strategy content and regards it as part of its formation activity. This view of the content dimension is possibly going to be observed in the contents section of the IS strategy documentation. It indicates the rationalist perspective that past claims are inadequate for comprehending real life circumstances.

The organisational fit framework was developed by Earl (1997) which defines the IS strategy's domains. There are three domains in the framework, and each includes specific aspects of the content dimension of the IS strategy. Earl (1997) claimed that the "*Organizational Fit Framework (OFF) is based on a simple and successful outlook of the way executives appear to be able to conceptualise strategic decision making regarding IT*". (p.1)

There are four strategy domains in OFF that are presumed to be interdependent and linked as follows: Organisational strategy, IT Strategy, IS Strategy, and Information Management Strategy. Each domain includes two parts, namely, "*a subset or various horizons of each set or domain (and even) two imperatives such as factors or considerations which should be considered and not left out"* (Earl, 1997, p.9).

Earl's framework is explained from the perspectives as follows:

- Organisational strategy: This domain includes both the elements of business strategy and the factors or features of the host company. There is substantial

impact of this domain on the three information domains since the contents of the organisation strategy that are established are often based on the selections made in IM, IT, and IS strategy. It concerns the *where* or *why* questions which require explanation. It addresses three key aspects. Business strategy answers *what* the whole concept is about. As this becomes clear in IS, a strategy is developed at the corporate level which is regarding the Mission, which businesses are included and which are not, shareholder value or added value, structure of business portfolio, and required or different resources and abilities. The Strategic Business Unit (SBU) works on the handling of the value chain, product-market choice, and competitive positioning. The Organisational choice is regarded as the formal definitions, configurations, and tools of structure and control. This domain comprises the management control system, organisation structure or design, and the formal policies and processes. It even comprises intent meaning which includes a Focus or criterion when making a choice, force crystallisation of purpose, a level of direction stability, and an operation orientation. The Context which is the main aspect of the organisation is the final aspect of the organisational choices. This provides answers to queries like, how things are managed here? Which flavours are being changed? Which values are sacrosanct? It comprises management style, the informal side, the culture, etc.

- The IT strategy is regarding technology and infrastructure-building set, or the *how* queries; while IS strategy domain is regarding the firms' required IS or

applications set, or the *what* queries. This domain should be applicable for each SBU or division and that too, collaboratively. Earl stated that these strategies would alter as per changes in the business environment (1997).

Are the other three domains being accommodated through IS strategy? It is regarding the opportunity, the alignment, SBU, and group. The alignment is determining the applications needed to back up the business strategy (the alignment queries). It is reliant on the clarification procedures and other techniques and methods like the following:

- Earl's organizational approach (Earl, 1996)
- Business systems planning (IBM, 1981)
- Critical success factors (Rockart, 1979).

The opportunity is finding out better uses of new technologies which could be utilised, so the business could be performed in a different way or new businesses could be established. These two queries or parts of the IS strategy have to be dealt with. Without taking into account IS needs and opportunities (or risks), the SBU which is the product's market strategies were not completely formulated. The IS strategies should be accountable for SBU. Lastly, this is not just each SBU, but is reword corporate level.

- IT strategies are effective for technology matters and technical terms, but not effective in determining application needs and business thinking. This domain is the basis for the remaining three domains. It includes scope, which is

regarding the technologies that have to be made part of the information strategy. Architecture is the technology outline which leads, forms, and regulates the IT infrastructure. It could include at least the aspects of data and applications, computing, and communication, and perceived as being in four stages of certainty. These are plans, policies, schemas, and parameters (Earl, 1989). If not extremely remarkable, there should at least be competency in the skills set, information regarding assets, and activities in the basic or key technologies that form the scope. Lastly, controls that are needed to execute and regulate the architecture (standards or policies).

- The author described the domain IM strategy as Information Management (IM) strategy regarding incorporation of management into IT or the way according to which IT had to be handled. This is management-focused, relationship-oriented, and organisation-based. It includes queries like mission and organisation of the IS function, regulation, and accounting for IT and design of the management procedures needed throughout all the IT activities of a firm. As opposed to the *what* and *how* queries, IM strategy is mainly focused on the *who* which includes relationships, responsibilities, and roles. Also, in its further control-oriented elements, *"it is focused on directing personal or functional operations and evaluating the resultant performance"* (1997 p. 4).

The output linkage through the IM strategy could be defined as procedures of a constitution on both informal and formal organisations. This includes roles as to *who* has *what* duties and power for information resource action and policies inside and

outside the IS function and at various stages in the firm. Usually, this leads to a question regarding stability between users and specialists and between centralisation and decentralisation. These are relations that are equally significant. The significance of partnerships in combining IS function with the firm is demonstrated by Henderson (1990). It was found by Earl (1993) that CIOs should focus on developing relations with colleagues and managers if they want the organisation to remain. CIOs should have good political and social skills to accomplish them and to improve relationship building.

The content dimension concentrates on the aspect of *what* the organization's vision for change is. There could be changes in the content with time due to likely changes in the organisational environment. It could thus be perceived as being fluidic in nature. In comparison to other elements of IS strategy like the IS alignment, the content dimension is more sensitive. It impacts IS strategy elements and is impacted by them. Basically, the strategy procedure is changed through content dimension and could be regarded as a part of its context. Similarly, it is only in terms of strategy process and organisational context, that the content dimension could be comprehended and addressed.

Considering the aforementioned, three parts were observed in the literature review which could have been regarded as critical factors so that IS strategy and business strategy could be aligned.

3.4.1 Top Management/ Chief Executive Officer (CEO)

From the mid to late 1990s, many researchers suggested substitute techniques for the IT alignment with the aims and objectives of the firm. The studies indicated that the business should consider how its aims and objectives have to be established so as to benefit from the recent technology. Clarke (1994) observed that in certain firms, IT was leading the strategic planning of those firms. It was observed by Bodamer (1999) that *"almost 75% of company presidents considered IT as a way to enhance productivity of services"* (p52).

Moreover, he observed that the firm's CEO or president was directly reported to by more than 80% of IT professionals. This showed the significance of IT for the president/CEO.

It was claimed by Anderson (2000) that all elements of a firm could be considerably influenced through the CEO, including use of IT in the firm. Thus, any link of IT with corporate aims and goals could be reliant on how IT is considered by the CEO, either as cost overhead or as a factor that improves execution of corporate strategy. He stated that the CEO is considered as the main strategy maker who develops the strategic plan and enforces its application on the whole firm. The medium-term objectives and long-term goals are established by the top management in this framework.

3.4.2 Information Systems Managers/Chief Information Officer (CIO)

The business needs of the firm should be clearly known by the CIO or IS managers as they assist in this alignment and preferably should be more engaged in the planning of the corporate goals of the business. In response to this, it is usually regarded by the employers of CIOs that they should have a trade-off either that a person with adequate technical capabilities to perform the job should be hired, or a person with appropriate business management competencies who knows the business should be hired, who would in turn hire technicians as per the requirements. According to Goldman (1999), "*one of the most difficult aspects of a job (of the CIO) is the alignment of IT with the business"* (p.71).

Enns et al. (2001) implied in their two studies that it was not compulsory to have such a trade-off. They observed that on an interpersonal level, it seems that successful CIOs have a thorough understanding of the role of successful influence and they have the required capabilities to adequately apply that influence (2001a).

They also discovered that when the assistance of senior executives is required by the CIO in the firm, it is actually the targeted executive's background, and not of the CIO that has a significant role in finding out the most effective tactics. The CIO's technical background does not have much impact on his/her usage of influence behaviours (2001).

They also observed that a consultative approach by the CIO is ideal when the executive does not have complete experience of the IT. When the executive has much IT background, then it is ideal to have a rational and technically sound method.

It was also presented by Enns et al. (2001) that CIOs should be flexible to their environment with the capability to communicate technically/rationally or consultatively, as required. Moreover, it is a must that they adjust to the intangibles of the firm's corporate culture.

3.4.3 The Role of Internal Consultants/Planning Team on Information System Alignment

Internal consultants play an exceptional role in bringing about effective change in organisations all over the world. They frequently play a major role in change management tasks that facilitate project implementation, besides facilitating the particular solution development and expertise, and at times, project management support, as well.

An internal consultant is defined by Trotter (2008) as a person or group that assists organisations in an advisory manner, including the following:

- Serving as an educator, change agent, facilitator, or coach in an organisation
- Providing for a specialized management consulting expertise so that the organisation's performance could be enhanced

- Working within the organisational structure to solve business matters and apply solutions in matters that include process improvement, strategic planning, or organisational efficiency/development

- Helping internal clients in a shared service kind of organisation, for instance: Training and Development; Human Resources; Finance; Information Technology; Quality Management; and Planning; Competitive/Business Intelligence, and Health, Safety and Environmental Services; etc.

It was claimed by Trotter (2008) that internal consultants should have basic consulting skills, knowledge, and experiences. Additional expertise in one or more major practice areas is beneficial, for instance, in organisational effectiveness/development, strategic/business planning, and performance measurement, IS planning, and process management. It is even essential to know the basic dynamics of dealing with a consulting kind of organisation.

In organisations, internal consultants are used for business development/corporate planning and for different service/support functions. The progress of internal consulting has been due, partly, because firms have been trying to obtain more value from their general "consulting spend". This involves increased focus on execution and continuous improvement besides more successfully passing technology from external consultants to the organisation. The tasks of internal consultants usually include collaboration with external consultants on big projects, conducting negotiations with external consulting contracts, and keeping a list of qualified

consulting suppliers who could provide their services in times of considerable or specialised demand (White and Adinolfi-Tejera, 2011).

In internal consulting, one of the quick developing growth areas includes organisational change management. In this context, internal consultants collaborate with leading management in the organisation to apply a stable change approach and develop it into different tasks in the firm, for instance, project management. Internal consultants are referred to in this study as a planning and supporting team (Rahimi et al., 2016).

The content in the contextualism methodological technique in this study is stated as the IS Alignment Domain; Organisational, Strategic, and IS. Three groups are requested to determine IS alignment domains in order to make the content of the IS alignments more feasible. These groups include Planning and Supporting teams, IS/IT Managers, and Senior Managers. The content elements of the suggested IS alignment structure is presented in Figure 3-3.

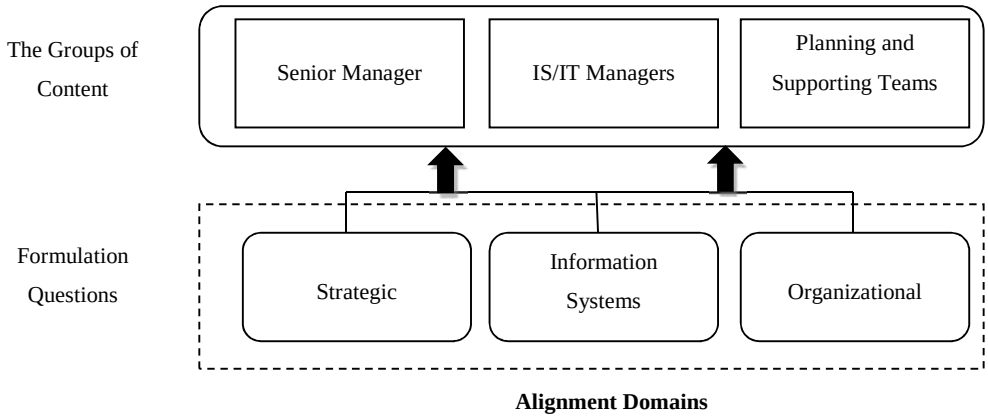

Figure 3-3: The content of IS alignment framework

3.5 The Process Dimension – The How

The Process dimension is described by Pettigrew (1990) as "*the actions, interactions, and reactions from different interested parties as they pursue movement of the firm from its current to future position"* (pp.657–658). It was theorised by Walsham (1993) as a dynamic link between action and context. The aspects of context, for instance, conceived authority or resources are utilised by human actors to perform the actions. Subsequently, these actions can improve the current structure of power or resource distribution. It could even develop a new order of authority or significance. Thus, the process dimension could be considered as a dynamic social system that is always flexible and being changed whenever required.

The Process dimension includes the overall functions that firms could carry out to associate IS strategy with business strategy. Das at el. (1991) defined the process

dimension in the IS domain as typical of the method that is followed by firms in forming and applying the IS strategy.

The process dimension addresses the query *how* of the IS alignment. It is by way of this dimension that the social complications of incorporating IS strategy with the firm's goals are understood. To be able to do this, Whipp (1989) claimed that it is essential to determine the following:

- Who is responsible for the development of a new strategy in the firm?
- What are the decision making methods and procedures through which they are developed?
- What are the models of change that perform the commencement and application?
- How suitable are they with regard to the context in which the firm functions?

3.6 Development of the Research Conceptual Framework

According to the literature review, it is clear that understanding all factors affecting IS Alignment in organistions is a critical issue to increase the opportunities to achieve successful integration. Table 3-2 shows the summary of the elements found from the literature review that helped to develop the research conceptual framework:

Table 3-2: Elements of the Research Conceptual Framework linked with the literature review

Elements of the Framework	Authors	Focus of Studies
Organisation Structure	Henderson and Venkatraman, 1993; Luftman and Zadeh, 2011; Chan, 2002; Cram et al., 2015; Hu and Huang, 2005; Galliers et al., 2012; Adaba et al., 2010; Hill et al., 2012	Several studies have highlighted the importance of organisational structure and IS structural to increase the level of alignment.
Organisation Culture	Pettigrew, 1990; Kappos and Rivard, 2008; Nickels and Janz, 2010; Hofstede, 1998; Schein, 2010; Hill et al., 2012; Waring and Skoumpopoulou, 2012; Meyerson and Martin, 1987; Chan, 2002	The role of organisation culture in affecting IS Alignment.
Political Aspect of Organisation	Markus, 1983; Salancik and Pfeffer, 1977; Alvesson and Willmott, 2012; Clegg, 1989; Introna, 1997; Silva and Backhouse 2003; Backhouse et al. 2006; Fragos et al. 2007; Silva 2007; Lapke and Dhillon 2008; Henderson and Venkatraman, 1989, 1993, 1999; Drory and Romm, 1988; Danish and Bodla, 2009; Chang et al., 2009	All activities regarding implementing IS integration in the organisation should be supported with political forces. MIS has to build closer links with political variables.
Top Management/ Chief Executive Officer (CEO)	Davoudi and Oraji, 2012; Besson and Rowe, 2012; 2011; Luftman and Zadeh, 2011; Tarafdar and Qrunfleh, 2010; Johnson and Lederer, 2010; Raymond and Croteau, 2009; Gutierrez et al.,.2009; Preston and Karahanna, 2009; Li and Tan, 2009; Chan and Reich, 2007; Ismail and King, 2007; Weiss et al., 2006; Smaczny, 2001; Khandelwal, 2000; Delisi et al., 1998; Downes	It was observed through the literature that there is a much effective alignment of IS with corporate objectives if the advantages of IS are better understood by the CEO and are engaged with the IS management. The conduct of the CEO toward IS, particularly the perspective of authors regarding use of IS in a firm and if it adds to the association of IS

Elements of the Framework	Authors	Focus of Studies
	and Mui, 1998; Weill and Broadbent, 1998; Earl, 1997	with corporate goals, was investigated in this study.
Information Systems Managers/Chief Information Officer (CIO)	Belfo and Sousa, 2012; Dhaliwala et al., 2011; Leidner et al., 2011; Luftman and Zadeh, 2011; Johnson and Lederer, 2010; Alfaouri et al., 2010; Li and Tan, 2009; Silvius, 2009; Preston and Karahanna, 2009; Baker and Jones, 2008; Chan and Reich, 2007; Chan et al., 2006; Silva et al., 2006; Weiss et al., 2006; Rathnam et al., 2005; Motjolopane and Brown, 2004; Smaczny, 2001; Earl, 1997	It was observed through the literature that for the incorporation of IS approach with business approach, there is considerable significance of the CIO's role. The CIO has to obtain the support of senior executives of the firm. Moreover, for effective IS alignment in firms, the management styles of the CIO are quite a critical factor.
Internal Consultants/Planning Team	Trotter, 2008; White and Adinolfi-Tejera, 2011; Rahimi et al., 2016	Internal consultants play a major role in organisational effectiveness/development, strategic/business planning, and performance measurement, IS planning, and process management. Therefore, the duties of Internal consultants affect the IS alignment in organisation.

The development of the conceptual framework process was designed in two stages. The first stage was developed based on the literature reviewed; a number of critical success factors are proposed in this study. The themes involved are organisational structure, roles and regulations, processes, organisation culture, and human resources. Furthermore, these themes are founded on the organisational, strategic, and IS

domains. These themes have been established in the literature as critical success factors for achieving IS alignment.

This structure could be obtained through previous studies, knowledge, and experiences that could provide directions to conceptualise and attain understanding of the phenomenon of IS alignment importance. In Figure 3-4, the initial conceptual framework for IS alignment includes three dimensions, namely, Strategic, Organisational, and Information Systems which are utilised to categorise and define factors through which IS alignment competencies are enhanced. The work of developing the initial proposed framework was presented by the researcher in the International Conference on Business, Management, Economic, and Finance (ICBMEF), 2013 and published in the International Journal of Business and Management Study (Alobaidly et al., 2014).

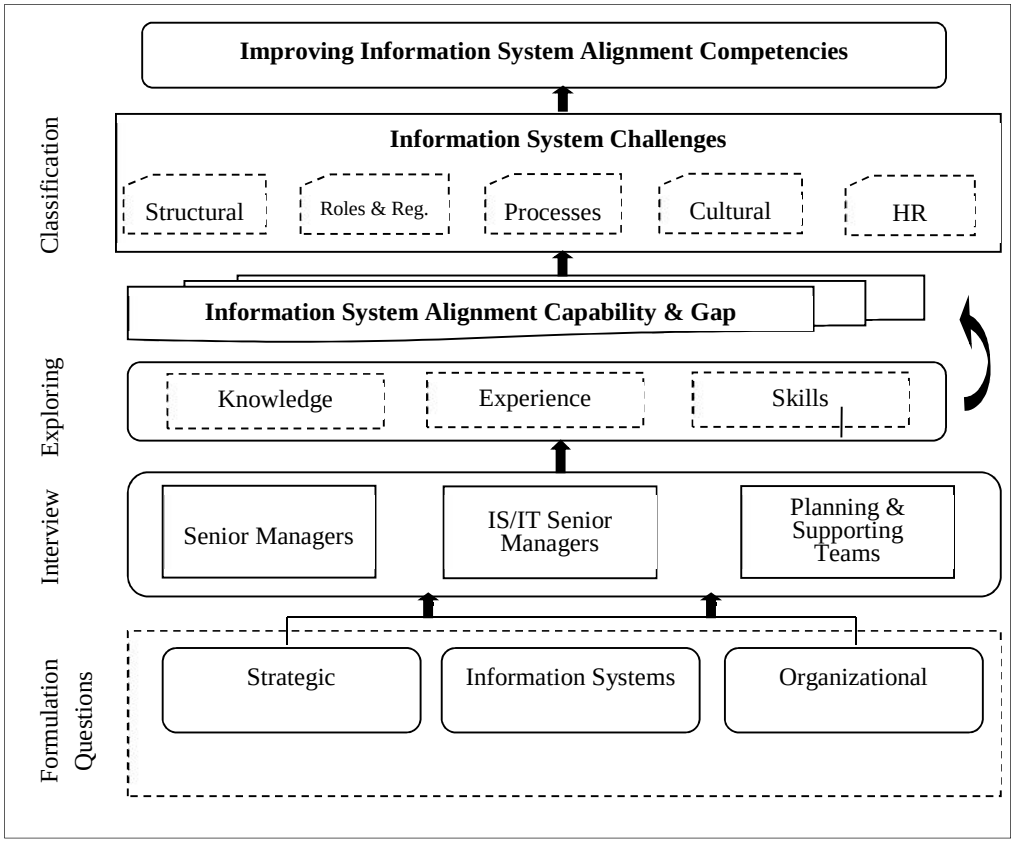

Figure 3-4: Initial proposed conceptual framework for investigating IS and Organisational Alignment

The aim of the proposed framework is to guide the empirical study to arrange the collection of empirical data and organise the subsequent case description and assessment. Based on the literature reviewed on Chapters two and three, as well as the developed framework of IS alignment, a number of CSFs are proposed in this study.

3.7 Chapter Summary

For the IS alignment implementation and adoption, construction of an initial theoretical framework is the major goal described in this chapter. This particular study freely employed the term 'framework'. The logic behind this framework is that the three views are encapsulated in the process such as the following: first, the proposed framework is aimed at to understand IS alignment competencies in the organisation, based upon the argument that the three domains in the organisation, namely, strategy, organisational, and IS domains have alignment implications. The framework is designed to identify the contributions of senior managers, CIOs, as well as planning and supporting teams with regard to integration activities.

Secondly, the proposed framework is considered as a guide to investigate knowledge, experience, and skills in the organisation, in order to identify the capabilities and gaps of IS alignment.

In addition, the framework is designed to link the IS alignment capabilities and gaps with the critical success factors to draw a clear map of the alignment challenges in the organisation. The critical success factors are classified into five categories as follows: cultural, structural, processes, roles, and regulations, as well as human resources.

The proposed framework is applied as a guide line for empirical data collection and analysis and to establish a comprehensive overview of IS alignment implementation and adoption in the scientific research centres in the State of Kuwait.

Chapter 4: Research Methodology

4.1 Introduction

The literature review has demonstrated that since the 1980s, IS alignment studies have been a matter of great concern for top management (Karpovsky and Galliers, 2015). However, there are relatively few pieces of detailed empirical research developing new theory and investigating practical solutions through which business and IS strategy can be combined in organisations.

The purpose of this chapter is to discuss the philosophical paradigms, research methods, and data analysis selected by the researcher. The chapter starts with discussion of the three primary schools of thought for researching in the IS field such as positivist, interpretive, and the critical paradigm. Moreover, the differences between qualitative and quantitative research are clarified as well. Next, the data collection strategies have been described. Furthermore, the justification of the selected research philosophy and methods are presented, followed by a brief discussion of data analysis techniques, particularly template analysis, has and why it has been adopted in this research. At the end, the ethical issues of this research are considered.

4.2 The Philosophical Paradigm for the Research

Several multidisciplinary aspects of IS are strongly associated with social science, business and management, mathematics, behavioural sciences, engineering, computing, and natural sciences. It is quite difficult to choose a suitable method of research to study IS related concepts (Galliers, 1994). IS is not always linked with one particular theoretical view (Orlikowski and Baroudi, 1991); thus, researchers can select an appropriate technique from various methods and strategies.

Easterby-Smith et al. (2012) described the way researchers could benefit from understanding research philosophy. Firstly, researchers are able to understand the method of research that is to be used in the study, that is, an overall strategy of the research, comprising the evidence to be collected, the way it would be comprehended, and the way research questions are to be answered. Secondly, suitable techniques for the research could be selected if the research philosophy is well-understood. This could be done by assessing the various approaches and techniques and finding out the benefits and shortcomings of a specific method in the research.

According to Collis and Hussey (2009), a research paradigm is an outline that indicates the way research has to be carried out. The basis of this is a theoretical body of knowledge. On another note, paradigm is described by Guba and Lincoln (1994) as a world perspective or belief system that leads the researcher in his research. They stated that there are three dimensions of a paradigm as follows:

- What is the system and nature of reality (the ontological question)?
- What is the link between the researcher, and what could be identified (the epistemological question)?
- How is the researcher able to identify that which he believes could be known (the methodological question)?

It is essential to ensure that paradigms are actually assumptions that do not have complete evidence. They are formed by humans and are neither right nor wrong. The value of the paradigm has to be debated by the supporters (Guba and Lincoln, 1994).

According to Oates (2006), a paradigm is basically the modes of thinking or a set of common assumptions regarding the way research is performed and knowledge is obtained.

To conduct empirical studies on the subject of IS, there are three primary schools of thought (paradigms) such as the critical social school, interpretivist school, and positivist school (Galliers 1991; Orlikowski and Baroudi, 1991; Walsham, 1995; Myers, 1997; Oates, 2006). Straub et al. (2005) stated there is a threefold dimension of the major epistemological stance associated with qualitative research, namely, critical, interpretative, or positivist. But, in quantitative research, the critical and interpretative stances are not of use; only the positivist one is useful. The qualitative and quantitative research epistemological assumptions are displayed in Figure 4-1.

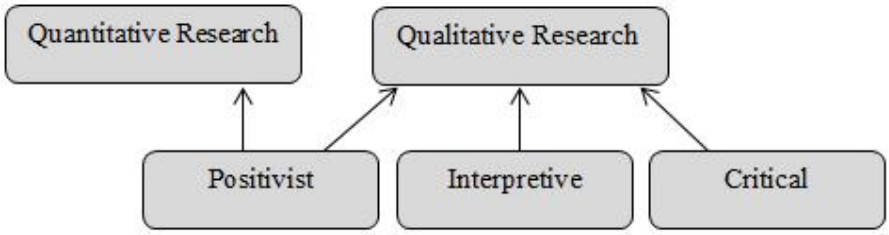

Figure 4-1: Epistemological Assumption for Qualitative and Quantitative Research (Source: Adopted from Straub et al., 2005)

Several researchers even stated that paradigms to be utilized in IS could even be taken up from various other fields like social science which is also multidisciplinary (Orlikowski and Baroudi, 1991).

4.2.1 Positivist Paradigm

An aspect being considered when research is being conducted, or a suitable research paradigm is being selected, is whether a interpretivist paradigm, a positivist paradigm, or a combination of both have to be selected. The positivist paradigm deals on evident and quantifiable occurrences which could be summarized as a set of reproducible factors. The researcher and the research are distinct and independent. However, the research and what is researched are not independent in phenomenological research. It considers the principles of the researcher, which assist in identifying the facts of the research and interpretations of the research outcomes. The degree of involvement by the researcher, the approach, and paradigm to be utilised will be identified through the

kind of query being asked, the research being performed, and the understandings of the research outcomes.

In a positivist paradigm, the emphasis is on measurement, objectivity, and repeatability. It is based on the presence of *a priori* fixed relations with phenomena which are usually examined with structured instrumentation (Orlikowski and Baroudi, 1991). Basically, it considers empiricism, which is the concept that measurement and observation are the basis of scientific efforts. According to this, application of scientific approaches to experiences and to the empirical world helps in attaining knowledge about the world (Eriksson and Kovalainen, 2008).

A significant matter regarding the application of a positivist paradigm is that, the data being considered are mostly properly described. Also, massive amounts of data would be available, but are not impacted through performance of the research. These data would still exist after research has been completed. Orlikowski and Baroudi (1991) specifically stated that, the research in IT could be regarded as positivist if "*evidence of formal propositions, hypotheses testing, quantifiable measures of variables, and the drawing of interpretations regarding a phenomenon from the sample to a stated population*". (p.5)

In actuality, positivism is reinforced through belief and objectivity which could be measured through scientific approaches by way of empirical review. Knowledge is obtained from data that are rational and are verified through mathematical evidence. It is presumed in positivism that factors of a social phenomenon could be measured,

evaluated, and described by the use of quantitative approaches so as to lead to generalisations identified as scientific laws (Crotty, 1998; Collis and Hussey, 2009).

Several features of the positivist paradigm stated by Oates (2005) are as follows:

- The world is individually present even without humans: A social and physical world is present "out there", which is not simply in minds, and has to be investigated, attained, and measured (such as the law of gravity).
- Measurement and modeling: The researcher studies this world through observations, measurements, and by forming models (hypotheses theories) in order to demonstrate the way it works.
- Objectivity: The researcher is objective, unbiased, and is an unprejudiced viewer. The characteristics of the world could be observed without any influence of the researcher's personal beliefs and principles.
- Hypothesis testing: The research is performed through empirical testing of hypothesis and theories that either proves or rejects them.
- Quantitative data analysis: A strong inclination towards mathematical modeling and proofs, and statistical analysis is frequently observed. A logical and objective approach for assessment of observations and findings is achieved through use of mathematics.
- Universal laws: A research aims for generalisations that could be proved to be true, irrespective of the researcher and the circumstance.

An inclination towards the positivistic paradigm has been observed in most of the Information System research (Orlikowski and Baroudi, 1991). A significant factor regarding the use of the positivist paradigm is that the data in question are mostly well-outlined; a great amount of data are available, and not impacted through carrying out of research, and would still exist once the research is completed. It is comparatively simple to form a questionnaire, pilot test it, and pass it on for filing. Then, it is only the waiting time for participants to fill out and return the questionnaire, assess it, and reach certain outcomes that are expectantly what the researcher has been aiming for. Thus, it is usually appealing to apply a quantitative approach like questionnaire, when the research is aiming for particular answers for particular questions. The researcher is impartial with regard to the research, and the questionnaire is usually measuring the interrelationships between specific variables. Yet, a very low response rate was observed in many studies that used a questionnaire. For example, a research study using questionnaire was performed by Hind (2001), but had only 10% response rate. In an article, he indicated a likely reason for this low response. He stated that being a researcher for the magazine (CIO), he had observed that answering of questionnaires was being avoided by people in the IT industry, particularly CIOs.

A similar avoidance was observed by Chetty (1996) when she performed a survey in her study regarding small- and medium- sized organisations in New Zealand, and even observed other issues with this kind of quantitative research. One of the organisations that she contacted stated that they had been contacted around ten times in the last year to take part in surveys. Thus, Chetty got to know through her research that organisations

in New Zealand were being over researched, and so were becoming more opposed to surveys.

Chetty concluded that it was becoming more difficult to perform quantitative research with organisations in New Zealand due to their comparatively small population to obtain information from. Due to this, Chetty cancelled her plan to utilise questionnaires. She opted for a qualitative approach, utilising the case study approach on the basis of Eisenhardt's (1989) and Yin's (2009) research on development and implementation of case study approaches in organisational research. For this research question, this method seemed suitable and effective. Nevertheless, it was decided to study all methods of research and test their appropriateness to make sure that this was truly a suitable approach.

4.2.2 The Interpretivism Paradigm

Alternate research paradigms, known as the constructionist or interpretive paradigm, have been created by researchers, since the positivist paradigm was formulated for investigating the natural world than for studying the social world.

Walsham (1995) stated that interpretive studies usually aim to know about the phenomena by way of meanings that people ascribe to them. "*In the IS, interpretive approaches of research are intended to develop an understanding of the setting of the information system and the procedure through which the information system impacts and is impacted by the context* (Walsham, 1993, p. 4–5*).*

It is presumed that in these methods, as researchers deal with the world around them, they comprehend and interpret in accordance with their own frame of reference (Orlikowski and Baroudi, 1991). As indicated by Andrade (2009), when interpretive methods are used, the researcher becomes a significant aspect, because the interpretive researcher adds his/her own preferences and beliefs to the research and signifies it through thorough definition and explanations. Contrary to the positivist method, reality is considered as socially formed, instead of being objectively formed (Collis and Hussey, 2009; Gray, 2009).

Berger and Luckmann (1991) stated that the philosophical basis of constructionist and interpretive study is in phenomenology and hermeneutics, since they influence the social formation of reality. As well, Johari (2009) claimed that interpretivism aims to further improve understanding of phenomena under various contextual situations. He also explained that the concept of interest is investigated from the participants' viewpoint. For instance, certain interpretive approaches enable participants to apply their own words and pictures to explain the concept or subject being studied from their own experiences.

IS research is regarded as interpretive, if it is presumed that our knowledge of reality is achieved by way of social constructions like language, shared meanings, consciousness, tool, documents, and other things. The interpretivist paradigm was applied in some studies in the IS field. For example, a general theoretical method for IS research is described by Walsham (1993) with an interpretive stance. He drew on the study of Kling (1987), Pettigrew (1990), and Giddens (2013). Walsham utilised

his method to provide in-depth explanations of three detailed case studies about information systems and in particular, the cultural and organisational perspectives. He derived his conclusions for IS practice in areas of strategy, design, and development, assessment, and implementation. The purpose of his work was to provide certain vocabulary and matters for debate in any specific practical context. Walsham (2006) stated that in the field of IS, interpretive research has become common since the 1990s. Johari (2009) also claimed that for study in the IS field, it is more suitable to use interpretivism.

Interpretivism and constructionism are of various types; however, the concern with subjective and shared meanings is the common feature in all types. This is regarding the way people infer and comprehend social happenings and contexts. The features of the interpretive paradigm as determined by Oates (2006) are as follows:

- Multiple subjective realities: Truth does not have one single form. Anything is regarded by researchers as real or as knowledge if it is a formation of their own minds; be it independently or in a group. The world is observed differently by different cultures or groups.
- Dynamic, socially constructed meaning: It is only through social constructions (such as shared meanings, language, and understanding) that reality can be understood and passed on to others. This is also different among groups and changes with time.

- Researcher reflexivity: Researchers are subjective. They are not impartial, but their assumptions, values, principles, and actions will unavoidably influence the research process.
- Study of people in the natural social settings: Interpretivist research intends to understand people in real situations. This is unlike the majority of experiments conducted in an artificial atmosphere in a laboratory.
- Qualitative data analysis: An interpretive researcher usually has his own preference for collection and evaluation of qualitative data. Even quantitative data collection, such as surveys, is utilised by researchers in an interpretive form.
- Multiple interpretations: Since there is no one fixed reasoning for what occurs in a research, researchers will give more than one reasoning.

4.2.3 Critical Paradigm

Myers and Avison (2002) claimed that social reality being historically established is presumed in the critical paradigm, and that people create and recreate it. A critical paradigm is intended to be a social critique through which the obstructive and isolating aspects of the status quo are focused on.

Myers and Avison (2002) also mentioned that people can consciously work to bring about changes in their social and economic situation. This is restrained through different kinds of cultural, social, and political control.

The critical and positivist paradigm indicates that an evident world that is free from individual consciousness exists. Yet, the critical paradigm also denotes that knowledge regarding the world is socially created. Thus, social reality is regarded by the critical paradigm as historically created, and that people create and recreate this so-called social reality. Contrary to interpretivists, researchers of the critical paradigm seem to control their experiences and modes of authority and evaluate the forms of power and domination that adjust and legitimise specific methods of observing their world (Oates, 2006).

According to Alvession and Deetz (2000), the emphasis of research on the critical paradigm is on determining and challenging assumptions on the usual methods of identifying; considering and acting; distinguishing the impact of culture, history, and social position on principles and actions; imaging and discovering extraordinary substitutes; and being suitably sceptical as regards any stated knowledge or solution to be the only truth or substitute.

Easton (2010) noted that critical realism is a comparatively a new direction which is being adopted in many fields, for instance sociology (Sayer, 2000; Layder, 1990), linguistics (Nellhaus, 1998), economics (Lawson,1997), psychiatry (Hanley, 1995), criminology (Pawson and Tilley, 1997), environmental studies (Bania, 1995), geography (Proctor, 1992; Yeung, 1997), history (Steinmetz, 1998), ecology (Trosper, 2005), religious studies (Robbins, 1999), law (Hanson and Yosifon, 2004), management (Ackroyd and Fleetwood, 2004), social work (Houston, 2001),

information studies (Wikgren, 2005), interdisciplinary science studies (Dickens, 2003), and media studies (Lau, 2004).

There are many different perspectives and strategies regarding realism (Hunt, 2003). Sayer (1992) inputted eight major assumptions of critical realism as follows:

- The world is present independently of our information regarding it.
- We have imperfect and theory-laden knowledge of the world. The notions regarding truth and falseness are not able to provide a logical view of the link between knowledge and its object. Yet, knowledge is not exempted from empirical checks, and its success in informing and describing effective material practice is not just a coincidence.
- Knowledge does not constantly develop in a continuous manner as the regular collection of facts under a balanced conceptual framework, nor does it irregularly develop by way of concurrent and universal changes in the concepts.
- In the world, there is necessity; the objects, be they social or natural, typically, have certain controls or techniques of acting and specific vulnerabilities.
- The world is stratified and distinguished, including not just events but even objects, such as structures, which have the controls and liabilities that could lead to events. These structures could exist even where, as in the social and most of the natural world, they do not lead to consistent patterns of events.

- Social phenomena like institutions, texts, and actions are dependent on concepts. It is not just their production and material impacts that have to be described, but even their meanings have to be comprehended, read, or interpreted. The interpretation is done irrespective of the researcher's understanding of them, even though the interpretation usually initiates from the researcher's own frames of meaning.
- Social practice is the science or the production of any type of knowledge either for good or bad (not only for bad); the content is impacted through the social links and conditions of the production of knowledge. Knowledge is mainly, but not solely, linguistic. Also, the nature of language and how we communicate are not related to what is already identified and communicated. For assessment of knowledge, it is important to have awareness of these relations.
- Social science should be analytical regarding its object. They should be critically assessed so as to explain and comprehend social phenomena.

4.3 Deductive versus Inductive

Bryman and Bell (2011) stated that there are two methods of research, namely, inductive and deductive that can be used to identify the nature of relation between a research process and theory. The inductive and deductive methods have been defined by Trochim and Donnelly (2008) as the broad methods of reasoning.

Hussey and Hussey (1997) described deductive research as a study which helps in the creation of conceptual and theoretical structures. This is tested by empirical observations. Therefore, specific instances are deducted from general inferences.

Deductive reasoning begins from being more general to more particular. At times, this is informally recognized as a "top-down" method. The starting point would be the theory that a researcher comes up with. It would be regarding the topic of interest. This would then be reduced to more particular hypothesis that could be tested. There is further reduction when the researcher gathers observations regarding the hypothesis. Finally, this results in the researcher being able to test the hypothesis with particular data. Then, he receives confirmation (or not) of the actual theories (Trochim and Donnelly, 2008). According to Eriksson and Kovalainen (2008), the confidence in theory development in this method is obtained through hypothesis testing under empirical scrutiny. "*When the deductivist approach is considered, the researcher initiates with a logical and abstract link among concepts and then work on solid empirical evidence* (Neuman, 2005, p.46).

Because inductive study includes formation of theory through observation of reality, Hussey and Hussey (1997) stated that general inferences are taken from specific instances.

Induction indicates that theories could be regarded as a corrective mode regarding findings or even publications that come up at the time of the research process (Johnson and Duberley, 2000). There is a different pattern for inductive reasoning, such that it

moves from particular observations to greater generalizations and concepts. This is at times recognized as a "bottom up" method (this is not "bottoms up" which is the term used by a bartender when he wants to inform customers that he wants to close for the night). We start with particular observations and measures in inductive reasoning. Then, we move towards pattern detection and regularities, develop certain tentative hypothesis that we could investigate, and lastly form certain general conclusions or concepts (Trochim and Donnelly, 2008).

4.4 Use of Qualitative Research versus Quantitative Research Approach

There has been a recent rise in discussions regarding the use of quantitative or qualitative approach, which was a topic of debate among researchers for the past 20 or 30 years. Although the exact constitution of both approaches is different among different researchers, they do have consensus on the central meanings and their practical impacts.

According to Myers (1997), quantitative research methodology was actually formed in the natural sciences so as to investigate natural phenomena. Thus, quantitative approach is extensively utilised when the research is conducted to allocate numbers to observation or to lead to a universal statement (Brynard and Hanekom, 1997).

Surveys and experiments are some tools of quantitative research with the purpose of testing hypothesis, using big samples of data and numerical approaches like mathematical modeling. It aims to determine link between cause and effect

relationships. Therefore, quantitative research is regarded as a positivist approach (Myers, 1997).

Qualitative research is recommended by Denzin and Lincoln (2005), since the researcher has to analyse things in their natural setting and try to understand or interpret the phenomena in the context of the meaning that people ascribe to them.

The concept was described by Corbin and Strauss (2008) as research in which outcomes are achieved by way of non-statistical/non-numerical means and are regarding lives of people, their behaviours, stories, social movements, organisations, or interactional relationships.

Qualitative research is holistic, subjective, and phenomenological. It is also descriptive, naturalistic, and anti-positivist. It involves the use of documents, interviews, or observations in a rigorous and systematic manner so as to investigate an aspect in its natural setting and reach to a meaningful conclusion by comprehending the collected data in a subjective way.

Table 4-1 presents the differences between quantitative and qualitative research summarised in depth by Holloway and Wheeler (2013).

Table 4-1: Quantitative and Qualitative Research (Holloway and Wheeler, 2013)

	Qualitative	**Quantitative**
Aim	- Exploration, Describing and comprehending the participant's experiences and life world	- Examining so as to obtain explanations - Testing hypothesis, prediction, control
Approach	- Development of theory through data - Inclined towards process - Originally broadly focused - Usually natural setting, Context-bound	- Inclined towards product - Narrow focus - Mostly in laboratory setting, Context free.
Sampling	- Participants, informants - Sampling units, for instance, time, place, concepts - Purposive and theoretical sampling - Developing the sampling during the data collection is flexible	- Respondents, participants - Sample frame fixed prior to commencement of research - Randomised sampling
Data Collection	- Documents, diaries, photograph, videos - Participant observation/Fieldwork - In-depth nonstandardised interviews	- Questionnaire, standardised interviews - Documents - Tightly structured observation - Randomised controlled trials
Analysis	- Thematic or constant comparative analysis, ethnographic, narrative analysis, latent content analysis, etc.	-Statistical analysis
Outcome	- A theory, story, ethnography	- Measurable and verifiable outcomes
Relationship	- Direct involvement of researchers - Close Researcher relationship	- Limited involvement of researcher with participants - Distant Researcher relationship

	Qualitative	Quantitative
Rigour	- Validity - Typicality and transferability - Trustworthiness, authenticity	- Generalizability - Internal/external validity, reliability

The basis for the criterion for classification of research approaches as qualitative or quantitative is that whether the research leads to numerical or statistical data. A method has to be selected for collection and evaluation of the resultant data. This could end up in the use of both quantitative and qualitative techniques at various stages of the study. This is considered as a mixed research method.

A comparative list between qualitative and quantitative methods of research has been formed by Guba and Lincoln (1994), Neuman (2005), and Creswell (2013). They agree on the following:

- In quantitative research, formal language is utilised; whereas, the language is informal in qualitative research.
- In quantitative research, generalisation results in prediction, explanation, and therefore understanding; whereas theories and patterns are formed through understanding in qualitative research.
- In quantitative research, researchers are not involved with what is being researched. As opposed to this, researchers interact with what is being investigated or researched in qualitative research.

- Data are in the form of numbers in quantitative research; while data are in the form of words from documents and observations in qualitative research.
- The analysis is mostly in the form of tables, charts, and statistics in quantitative research, and even by discussing the way they are linked with the given hypothesis. In qualitative analysis, data are utilised to obtain generalisation from what is found and arranging them to achieve a reliable depiction.

A summary of the strengths and weaknesses of the qualitative and quantitative approaches as per Ryan and Bernard (2000) is presented in Table 4-2.

Table 4-2: Strengths and Weaknesses of the Quantitative and Qualitative Methods (Ryan and Bernard, 2000)

Method	Strength	Weakness
Qualitative Method	• Qualitative analysis leads to a thorough, rich, and in-depth description. • In comparison to quantitative approaches, this approach could be considered as faster. • In qualitative approach analysis, any vagueness, which is natural in human language, could be identified. • Does not reduce multifaceted human experiences to a numerical form and leads to a good understanding of a person's behaviour and experiences • Qualitative methods could cost less than quantitative research.	• It is hard to analyse qualitative data and requires a high degree of interpretative abilities. • Has a high chance of impartiality • Difficult to lead to short conclusions through qualitative data • With regard to statistics, there is a lower level of precision. • It is difficult to make comparisons through qualitative data.
Quantitative Method	• Quantitative analysis helps with categorisation of features, counting them, and creating more complex statistical models in order to describe what has been observed. • It is easier for researchers to evaluate, since quantitative data are in numerical form. • Outcomes could be generalised to a larger population. • It compares measures of dispersion. • It could lead to high level of precision. • Analysis could also be graphically presented.	• When compared with data achieved through qualitative analysis reduced to numerical form; there is lesser detail in the image of the data that is achieved through quantitative analysis. • Low rates of response • Not easy to implement • Quantitative application is slow, and requires relatively more time. Can be costly.

Creswell (2013) stated that researchers also select the kind of study with the selection of the research methods, besides opting for various research approaches such as quantitative, qualitative, or mixed.

4.5 Justification of the Selected Research Philosophy and Methods

Crotty (1998) mentioned that two queries should be answered by the researcher. First of all, the methodologies and techniques to be applied in the research and secondly, how these selections will be justified by the researcher. Crotty (1998) also stated that the first query is reliant on the research question applied by the researcher, with the justification being linked to the assumptions of the researcher. These assumptions are based on the theoretical viewpoint regarding the research. A researcher has to first understand the research paradigm so that initial selections of research design and process could be taken. The research design helps in determining the strategy of the research. The way in which a good research can be conducted, according to Hamilton and Ives (1982), is not just in the selection of the appropriate research strategy, but also in asking the appropriate question and choosing the most effective technique for answering the questions once the aims, research setting, and other important factors are determined.

4.5.1 Research Philosophy and Approach

- A number of categorisations of IS research methods have been developed in the past years. For example, the appropriate methods for IS research have been determined by Galliers and Sutherland (1991). He formulated for the IS research approach two categories as follows: Scientific approaches: These are approaches with features of refutability, repeatability, and reductionism. They

considered that observations of the phenomena being studied can be made rigorously and objectively.

- Interpretivist approaches: The scientific philosophy is inappropriate in social science enquiry due to the likelihood of various meanings of social phenomena, how the social system being examined is influenced through the researcher, and the issues linked with predicting future events regarding human activities.

Klein and Myers (1999) provided another classification. The categories in which they divided the IS research philosophy constitute the following:

- Positivist
- Critical
- Interpretive

The basis of the positivist philosophy is the method used in the natural sciences, presuming that social reality is not linked with human perspective, which is present irrespective of our information regarding it. This means that permanent laws are present in the social systems and that, these laws can be taken and assessed separately from the social system itself. Therefore, this strategy indicates that there are facts regarding the social world that could be gathered and assessed independently of the people from whom the facts were received. On the basis of this philosophy, research is usually linked with a quantitative research approach. It aims to calculate the

variables of interest quantitatively. Statistical measures of validity and reliability are usually used to evaluate the quality of the research.

As opposed to this, the aim of interpretivist/phenomenological research philosophy is to comprehend human conduct from the participant's own perspective. It claims that social reality is based on our subjective minds and that, human conduct is understood through their social setting that is 'socially constructed'. Accordingly, understanding and describing phenomena in a specific context, instead of looking for universal rules and trying to describe them beyond any localized setting, should be the aim of a researcher. Thus, interpretivist/phenomenological research emphasises on the meaning that research subjects are linked to social phenomena. Of much importance in the research is what the researcher tries to comprehend as to what is going on and why it is occurring. According to this philosophy, research is usually linked with a qualitative research approach. It aims to study and understand the perspectives through observation and interviews of participants so that human and social activities could be understood.

If the key tasks were considered to be one of social critiques, then the research would be regarded as a critical one. In such a research, emphasis is on the restrictive and alienating conditions of the status quo.

This PhD research aims to formulate a practical model of the IS alignment that could be implemented for SR&D organisations. This would assist in enhancing technology transfer activities. This research was carried out in accordance with the participant's

opinions that are aligned with contextual understanding. This research study is being supported through an interpretivist/phenomenological philosophy. Employing a qualitative approach, detailed interviews were used to accomplish the objectives of this research. A qualitative approach will assist in understanding a phenomenon and its specific cultural and social context. This would not be possible if the data were quantified. The design of the qualitative techniques, the way qualitative data would be collected by way of open-ended question interviews, and the way data would be evaluated in inductive and deductive ways are discussed in the ensuing section.

4.5.2 Qualitative Methodology and Case Study

As mentioned previously, optimum results will be achieved through the use of a qualitative approach within the interpretivist paradigm. In this research, several qualitative techniques could be employed. Morse (1994) mentioned that each qualitative technique leads to specific and exclusive perspectives that reflect particular elements of reality in a better way than other techniques. It even results in outcomes that are more appropriate for certain applications than others.

Case study methodology was described by Collis and Hussey (2009) as an approach employed to investigate a single phenomenon (the case) in a natural setting and employing a number of techniques to attain detailed information.

Oates (2006) provided an appropriate description of the case study approach by stating that in a case study, there is emphasis on a single instance of the aspect that is to be

examined, be it a department, a discussion forum, a firm, an information system, a development project, a systems developer, a decision, etc. It involved a detailed study of this one instance, or case, by employing a number of data generation techniques. To attain in-depth information regarding the life of that case and its interlinked relationships and procedures is the purpose of this approach. It was claimed by Oates that a case study examines a selected case as per its real-life perspective. It concentrates on all the matters, aspects, procedures, politics, and relationships that occur in real life. A researcher will attempt to solve several queries of where, how, and why by studying all these elements and demonstrating an in-depth representation of the way they connect together (Oates, 2006).

The case study was outlined by Yin (2014) by the following:

- The purpose of the research is not just to investigate particular phenomena, but to comprehend them in a specific context.
- The research does not start with a list of concepts and queries regarding the parameters under which a study would be conducted.
- Several methods for collection of data are employed in the research. These could be quantitative or qualitative methods.

One unit of analysis is selected in case study research, for instance, a department in a firm, a firm, a set of workers, or even an individual in certain instances. The entire data that are present regarding that unit of analysis are collected and are mostly from

different sources, such as interviews, published reports, observations, source documents, etc. The collected data usually cover a long period of time.

It has been widely accepted by researchers that confidence in the outcomes of the research would be higher and the confirmation of the concepts suggested through the research if multiple sources are used for data collection. Eisenhardt (1989) observed that due to the triangulation through multiple sources of data collection, a better confirmation of concepts and hypothesis exists.

Even though case study research is usually limited to investigation of one phenomenon of interest, it does not essentially have to be limited to one instance. According to Edwards (1998), case study research involves a single or multiple cases of a phenomenon of interest, methodically investigated in order to be able to understand, create, or extend a theoretical structure.

The same author even mentioned that case-based strategies are utilised in a number of qualitative research approaches. Evidently, case study has proven to have much acceptance and effectiveness in matters of implementation in a number of areas.

Various types of case studies have been given definitions, such as the following:

- Descriptive case studies: it aims to define the phenomenon being examined.
- Exploratory case studies: there is a small number of theories or a weak body of knowledge.

- Experimental case studies: the research determines the issues in the implementation of new processes and methods, and even in assessing their advantages.
- Explanatory case studies: In this, theory is used to describe and comprehend the phenomenon being researched.
- Illustrative case studies: the research attempts to highlight new and innovative practices implemented by firms.
- Opportunist case studies: the research involves the study of a certain phenomenan, by having an availability of a particular business, or person, or other situation (Collis and Hussey, 2009).

There are opposing views as to whether or not the use of the case study method is effective in carrying out research. While case study has not been considered suitable by authors like Rossi and Freeman (1993) and Gelfand et al (1988), considering that this approach could not be used to draw general principles, Chetty (1996) argued that case study is an effective tool, after having observed much opposition against other kinds of research methods, particularly in the use of questionnaires.

Another critique came from Yin (1994), who stated that case study research as a qualitative approach has not been fully utilised and not valued for its methodological advantages, and that many people employ it only as a last resort approach, and even more, with uncertainty and apprehension.

A Case study approach is however supported by Eisenhardt (1989), who also formulated a procedure for developing theories through case study research, revolving around the eight steps in the process as follows: Getting Started; Choosing Cases; Crafting Tools and Protocols; Entering the Field; Evaluating Data; Determining Hypothesis, Enclosing Literature, and Reaching Closure. According to Eisenhardt, this procedure added further benefit to the case study approach, since it enabled the researcher to continually test, analyse, and build on the theories being examined during the whole process, by moving to and for through the steps as required:

> *"For example, an investigator may work on cross-case comparison, and then on redefinition of the research question, and out to the fields to gather evidence on an additional case".* *(*p546.*)*

Nonetheless, with all these disagreeing views, the case study technique, regardless, of whatever contradictory positions varied authors would have, the case study approach has much relevance and is effective and efficient as a tool in studying the phenomenon being investigated and examined from the perspective of people within the organisational structure. In all practical purposes, an SR&D organisation is viewed as an exemplar or prototype from which an IS alignment model can be formulated to be used by the organisation and other SR&D organisations of a similar nature.

- **Confirmation of the Research Methodology**

The purpose of the research is to form a practical model of IS alignment that could be implemented for SR&D organisations in order to enhance technology transfer

activities. In accordance with the research objectives, including a study of the present methodologies and evaluation of the past research, it was believed that the most ideal approach for examining this topic would be formation of a theory from an exploratory case study. To be further explicit about the suitability of this approach, Collis and Hussey (2009 p5) posited: "*exploratory research is carried out for a research problem when there are not many or no prior studies which could be referred to for information regarding the matter. To determine concepts, patterns, or hypothesis, instead of testing or verifying a hypothesis is the objective of this kind of study.*"

A single case study method has been applied as the design frame for the study. For the research, Yin's methodology (2014) is merged with that of other methods taken from Eisenhardt (1989), Rossi and Freeman (1993), Chetty (1996a), Edwards (1998), and Walsham (2001).

Yin's method has been verified, revised, and improved over the years. This approach was first suggested in 1984 in his book "Case Study Research: Design and Methods", 5th edition. This approach is commonly referred to as the basis for a number of case study researches.

4.6 Data Collection Strategies

This section aims to record the information attained through the process of data collection in the research. A single case study approach with four centres of research was employed to accomplish the research objectives and study IS alignment. The objective while studying the research centres was to collect information from as many

sources possible, pertinent to the research regarding each research centre in the organisation.

Data collection was started when the researcher formed a set of categories to merge the data. These categories are regarded as constructs; each is typical of a particular aspect of the IS strategy development phenomena. Qualitative data collection is mostly multi-approach, comprising of observing, interviewing, and evaluating documents. A researcher is able to verify and double-check the outcomes through the use of various sources of information (Creswell, 2013).

Data were collected through two distinct sources. The first source of data was an in-depth analysis of documentary data. Interviews constituted the second source of data, but were regarded as the major source of data. An outline of the data collection sources is subsequently presented in the succeeding pages.

4.6.1 Documentary Data

A researcher is able to understand the case study and all the factors and drivers in the internal and external environment through documentary data. They are the secondary sources that provide descriptive information regarding the case study and are composed of the following:

- **Annual reports:** These refer to information on annual plans, achievement reports, performance assessment reports, and KISR's scientific reports of the

centres. These also include information on current projects, research centre's structure, summaries of projects that have been completed, and operating policies and procedures, etc.

- **IT review reports:** These include considerable information regarding use of IT at KISR, the network and operating systems reports, technical assistance reports, storing and concealing of the electronic information that the research centres have and operating assistance for software use, operating network and the equipment-needed reports, and data management for all the functional departments in the research centres.
- **Strategic plans:** These refer to past strategic plans from 1976–2015, achievement reports, the strategic plan for 2015–2020, and the total action plan reports. A review on all these plans was conducted.
- **Financing and marketing material:** These include information regarding the research centres' selected market 'clients', the business plans, annual incomes, budgetary concerns, etc.
- **KISR Transformation Project documents:** These are documents prepared by KISR with Arthur D. Little (Consultant who provided the guidance, advice, review, organisation, production, and who helped facilitate implementation. Added to this was assistance from external subject matter experts. The project aims to change KISR into an 'R&D Centre of Excellence, focusing on innovation in support of the State of Kuwait' and aligned with the Kuwait Government's initiative to enhance technology transfer via SR&D

organisations. Ample source of information regarding the new strategic plan for 2015–2020, restructuring processes of the research centres, and the augmentation of current rules and policies proved helpful in the process of investigation.

- **Official meetings:** These are sessions held to discuss pertinent issues and concerns of every centre. These meetings are conducted as per schedules to deliberate on matters of performance evaluation annual operation plans Project Review Meetings (PRM), and senior management meetings for IT and general management of the research centres. Detailed information, regarding research centres' utilisation of IT, how they plan for all IT requirements, system integration, outsourcing, future IT utilisation to support the business. Hardware and software supplies were obtained through these meetings.

All these documents have become easily accessible and available to the researcher, being a member of the KISR planning team. Moreover, the researcher was able to carry out interviews and obtain access to a lot of information for this research since he is well-recognised by the senior management and is considered a dependable systems analyst in the Institute.

4.6.2 Interviews

In a qualitative research study, interviews are often important, particularly in case studies. Through interviews, researchers gain easy access to capturing candid and up-

front expressions about people's opinions and experiences (Oates, 2006). As claimed by Yin (2014), interviews represent one of the most significant sources of case study information. While he acknowledged interviews to be having certain issues of bias, incorrect articulation, and poor recall; he however, assured that interviews as a tool are important and that because the majority of case studies are regarding human affairs, by which these affairs should be understood and reported by certain particular interviewees. Moreover, he stressed that interviews can provide shortcuts to the past history of the incidence, assisting the researcher in determining other competent and capable sources.

Fontana and Frey (2005) put forward three kinds of interviews, namely, unstructured, semi-structured, and structured. Interviews are focused conversations with participants from whom information is generated in answer to a research question. Pre-set questions are incorporated in a structured interview, and all participants are asked the same questions in the same pattern. On the other hand, the researcher provides a format of the subject matter and topics to be included in a semi-structured interview where the interviewer works on the pattern and terms to be used during the interview process (Patton, 2002). Meanwhile, in an unstructured interview, no pre-set format prior to the interview is present. Correspondingly, questions are asked according to the immediate context and as per the natural course of conversation (Patton, 2002).

In this research, interviews helped in obtaining understanding of the views and experiences of key stakeholders. Alongside interviews, documentation analysis

techniques were also used in order to avoid any limitations of this technique. Through this, the researcher was able to arrive at detailed opinions and experiences of well-informed people who are closely involved with IS alignment. In this context, Yin (2014) observed that a point of data saturation is reached in such interviews after around eight interviews. As agreed, 20–25 interviews should be conducted, since a greater number of interviews would help in eliminating such bias that can occur in this kind of qualitative research (Stake, 1995). This would help in increased and improved reliability of research outcomes. The interviewees were not asked about the same segment in the departments, but had experiences of various sub-segments. This also helped to eliminate partiality/bias or any preconception in the results. Along with documentary analysis, triangulation of data was also used.

Semi-structured interviews were mainly utilised in this research. Semi-structured interviews were used to obtain detailed information and random and honest responses expressing their views during their work time. The interviews being held during office hours added depth to the study. These face-to-face conversations between the researcher and the interviewees gave more up close and personal interactions. The researcher was able to comprehend the world through the subject's perspectives when they used interviews. Notwithstanding, interviews are intrusive, costly, and require time with regard to evaluation and interpretation. According to Wengraf (2001), several questions are pre-set in a semi-structured interview. However, these pre-set questions are developed to be open enough, since subsequent questions of the

interviewer cannot be pre-set and thus, have to be modified in a careful and theorised manner.

In comparison to other kinds of interviews, the key benefit of employing semi-structured interviews is their flexibility and capability to obtain further in-depth information from participants. It even enables investigation of those aspects where the interviewee identifies such differences, gaps, and problems that could not have been identified through predetermined structured questions. Moreover, they provide the liberty to search, examine, and inquire questions that enable the researcher to comprehend and record the viewpoints of the programme respondents. This helps in incorporating all specific aspects without any prearranging of them.

- **Interview Questions**

The formation of interview questions and format was done at the time of the literature review and development of the research conceptual outline. A number of topics were included in the interview questions, for instance, general information regarding strategic planning in the organisation and the degree of participation in the planning processes; the extent to which alignment is developed in organisations; the issues, restraints, or difficulties faced by them during alignment; and the amount of information and experiences of IS alignment in the various sets of interviewees. For non-native English speaker participants, translation of interview questions was done in Arabic language through the use of the direction translation method (Appendix A).

Translation validation was not done during the pilot stage, because the thesis writer and the adviser as well, did not find the need to validate the translation from Arabic to English. While Arabic is the writer's first language, English can be ranked as his second after having had his education at the UK and also, it being a functional medium of communication and in work performance in his workplace.

- **The Pilot interviews**

Interview questions and the time required for each interview were tested through pilot interviews. These pilot interviews were carried out with various interviewees from the different sets of participants. The interviewees included one IS senior manager, one from among the senior managers from the research centre, and one from the planning and support team. During the pilot interviews, the researcher was mindful of the following:

- People enjoyed discussing their own experiences and spent considerable time in answering one question.
- The researcher jotted down notes and wrote down the answers of interviewees.
- While most of the interviewees were open about having their names mentioned, as well as their views on questions asked from them, the researcher was careful about not indicating personal information for ethical reasons.
- Interviewees did not prefer that their opinions be recorded.

The interview questions were revised on the basis of the feedback/outcomes from the pilot interviews. The objective of the interviews was to collect only the most germane

and related aspects to the research. In the process, some redundant/unrelated questions were either omitted or transferred to another set of questions, just in case they may be of significance some time later in the analysis and discussion. Questions were divided into sets in accordance with the interviewees' level and role in the Institute (IS/IT senior managers, senior managers of the research centre, and planning and support teams) and their field of specialisation. The target groups, questions posed to each group, objective of every question, and pertinent studies are summarised in Table 4-3.

Table 4-3: A Summary of Interview Details

Domains	Questions	Description and Purpose	Related Studies	Group
Strategic	1. Is the strategy for your centre of research well-defined? Focused? Are the objectives clearly specified?	To find out the degree to which strategic plan (SP) is understood	-Reich and Benbasat, 1996; 2000. -Morton,1991.	All groups -IS/IT Senior Managers -Senior Managers of Research Centres. -Planning and Support Teams
	2. Do you take part in the strategic planning procedure? If yes, what role do you perform in it?	To be aware in developing and participating in the SP	-Luftman et al. 1999. -Luftman, 1996; 2000; 2002. -Luftman and Ben_Zvi, 2010	
	3. In what way do you describe IS/IT alignment? What is its meaning for you?	To acquire an understanding of IS/IT alignment	-Pater, 2002. -Rathnam et al., 2005	
	4. Is IS/IT alignment considered by your centre of research in the strategic plan approaches? If yes, which process is employed?	To find out if there is additional IS/IT alignment in the strategic plan procedure	-Voss, 1989. -Platts, 1995. -Porter, 2001;1985. -Ward and Peppard, 2002. -Wainwright and Waring, 2004.	

Domains	Questions	Description and Purpose	Related Studies	Group
	5. Is your alignment effective? If yes, why? How were you able to deduce this?	To determine the gaps in the implementation of IS/IT alignment	-Norton, 2002. -Rathnam et al., 2004.	
	6. What was the value-added through your IS/IT alignment (competitive differentiation, innovation, greater profitability, revenue growth, new products and services, any other?).	To analyse the beneficial effect of IS/IT alignment on certain aspects in the organisation	-Porter, 2001; 1985. -Jeanne and Peter, 2002.	
	7. How could IS/IT alignment be enhanced by the firm?	This question could provide facility in understanding the recommendations for the enhancement of IS/IT alignment.	-Luftman et al. 1999. -Luftman, 1996; 2000; 2002. -Luftman & Ben_Zvi, 2010.	
	8. What are the main problems occurring during the strategy alignment process?	To discover the problems faced during the implementation of IS/IT alignment	-Henderson and Venkatraman 1989, 1993. -Norton, 2002.	
Information Systems	1. Is the CEO compliant to the significance of IS and its effect on the accomplishment of organisational aims and objectives? How is the relationship like between the CEO and the IS divisions (NSTIC)?	To find out the level of trust of CIO in their CEO and the nature of relationship between them	-Luftman et al. 1999. -Luftman, 1996; 2000; 2002. -Ross et al., 2009	IS/IT Senior Managers
	2. Is there any role of IT in developing the organisational strategy? Or does IT play a secondary role in implementing the present organisational strategy?	To assess the role played by IT in accomplishing the goals and objectives of the firm	-Earl 1989; 1993 -Morton, 1991. -De Wit and Meyer, 2004 -Ross et al., 2009.	

Domains	Questions	Description and Purpose	Related Studies	Group
	If yes, in what way? If not, why?			
	3. What obstacles are faced with aligning IS/IT with the business strategy?	To find out the obstacles faced when implementing IS/IT alignment	-Rathnam et al., 2004	
Organisational	1. Are the critical business activities in the value chain supported by IT?	To determine the managerial department's satisfaction over IT services and supports.	-Porter, 2001. -Wainwright and Waring, 2004.	Planning and Support Teams
	2. In what way does the firm's IT assist in the implementation of the strategy (local and wide area networks, e-commerce capabilities, internet, and intranet, etc.)?	To determine the managerial department's satisfaction over IT services and support.	-Morton, 1991 -Porter, 2001. -Ross et al., 2009.	

Arabic translation of this table is presented in Appendix A.

- **Interview Procedures**

Since most respondents were in agreement to have the interview questions asked/written either in English or Arabic, the final consensus was that all interview sessions would both be formulated in both languages. However, some technical terms have remained in English to avoid any problem in translating them to Arabic for the Arabic-speaking participants. All the same, participants were free to answer questions according to their language preference. For validity and reliability in results, the answers were simultaneously noted down in both English and Arabic.

A printed and uniform list as a guideline for semi-structured interviews was used to carry out the interviews. Also, the interview questions were categorised according to

the interviewees' group levels and on the basis of the different roles of the interviewees, meaning in that, questions may not be the same for all samples. Nevertheless, to minimise bias and partiality in the results, the majority of questions that were asked according to the role were presented in the same manner to each interviewee. Furthermore, open-ended questions were asked from all those interviewees to allow more freedom during the interview process. As well, some questions were not pre-set, and follow-up questions came up as they gave out their responses.

The interviews were separately carried out, and all were up close and face-to-face. The duration of each interview on an average was 45 minutes. Around two weeks before the interview, appointments were made over the phone with each participant, so that the interview time is better utilised, and interviewees are able to organise their thoughts. The phone call was placed to remind the interviewer about the study background and provided them with interview questions.

The researcher helped with the interviews so as to prompt significant concepts, yet was careful not to recommend or preempt any concepts that were not stated by the interviewees themselves.

The interviews were mostly in Arabic language, while some were in English when the interviewees were themselves willing to speak in English. Each interview was a private and confidential one. The researcher kept a suitable procedure of setting up interview appointments with those who were ready to take part in the study.

- **Interview Sample**

There are different views regarding the number of interviews to be conducted in order to accomplish adequate and effective qualitative research. Ritchie et al. (2013) claimed that qualitative research is more about interpreting the meaning rather than generalising perspectives; therefore, a small sample size is usually sufficient for this kind of research. They suggested that the biggest sample size should be less than 50 in qualitative research; otherwise, the amount of data would make it difficult to evaluate and interpret the data. Nineteen experts in the field of social science research were interviewed by Baker and Edwards (2012). In their conclusion, they stated that there is no specific quantity of interviews that should be conducted and that "*it depends on the nature of the research"* (Baker and Edwards, 2012, p.2). In their study, the experts provided information regarding the systematic, epistemological, and practical matters of performing research. They believed that when research has to be undertaken, the goals and objectives and available resources and time are the key aspects to consider (Baker and Edwards, 2012). It was also mentioned by Eriksson and Kovalainen (2008) and Lewis et al. (2009), that besides aims and objectives of a study, even the available budget and time should be taken into account when interviews are carried out. For instance, 560 PhD theses from www.theses.com that employed qualitative interviews as the data collection technique were reviewed by Mason (2010). It was observed that the most common sample size was between 20 and 30 interviews. Bernard (2012) believed that sample sizes for qualitative research should mostly be between 30–60 interviews. Yin (2014), in agreement, declared that

these types of interview reach a certain point of data saturation after around eight people have been interviewed. According to Creswell (2013), there should be a minimum of six participants in phenomenological research.

Interview samples were chosen from the four centres of research as follows:

- Water Research Centre (WRC)
- Energy and Buildings Research Centre (EBRC)
- Environment and Life Sciences Research Centre (ELSRC)
- Petroleum Research Centre (PRC)

It was agreed that in this study, around 30–35 interviewees would be included, According to Stake (1995) and Lam (2005), a bigger set would facilitate the minimisation of data bias, which can usually be an issue with this kind of qualitative research. Moreover, it could improve the reliability of the research outcomes. The interviewees were not exposed to the same departments of the Institute and had experiences with different divisions. This also helped in reducing bias. 64 proposed participants have been stated. Finally, a total of 37 interviewees constituted the samples; those suggested 27 participants were excluded, as they were unwilling or unable to participate. Table 4-4 shows the list. The participants' list comprised the following:

- Senior Management (CEO): The head research areas, division directors, and managers of the research centre are part of this group. This group is composed of people involved in management roles. They give instructions, authorise

research project funds, execute strategies, and decide on the approach and policy in the research centre and/or departments.

- Senior Research Scientist (Researchers): The tasks of this group include formation of research proposals, directing the research team, and forming and carrying out scientific applied research.
- IS/IT Senior Manager (CIO): This group comprises the Head of Technical Services, Computer Technology, Systems Development, Information Services, and Communications Departments. This group supports R&D programs and activities at the centres of research, with knowledge solutions and advanced information technologies.
- Planning and Support Team (Consultants**)**: This group helps the institute in advisory matters. It provides a specialised management consulting expertise in order to improve performance of the organisation.

Table 4-4: Participant-Interviewees

Senior Management	**IS/IT Senior Manager**	**Researchers**	**Consultants**
9	7	13	8

4.7 Data Analysis Method

The emphasis of qualitative research is on analysing incidents as they naturally take place and work within the context of the research topic. Through this, it is assured that qualitative research is naturally reported with in-depth and thorough information. This signifies its strong prospects for indicating complex findings as it provides

detailed information within a real organisational context. The manner in which we consider qualitative analysis is subsequently affected through the features of qualitative data. The richness of qualitative data enables the analysis to be complex with fundamental implications and layers of the social world. Denscombe (2007) stated that analysis signifies the division of something into its constituent parts. For this to be done, firstly, the researcher has to identify these components. This associates with a further implication of analysis, which means tracing elements back to their original sources. After this, analysis is done by exploring under the surface appearance of an aspect so as to uncover the constituent elements that have combined together to form it. The researcher traces elements back to there original source so as to reveal certain general principles that could be utilised to describe the nature of the subject being analysed. It could even be applicable in other circumstances (Denscombe, 2007).

4.7.1 General Strategy for Data Analysis Process

A general strategy was taken into account in order to conduct this research study due to its core significance regarding the data analysis process and its techniques. This general strategy was built up to analyse a number of distinct techniques and select the most appropriate to ensure effective analysis.

There exist two primary strategies; one is dependent on the theoretical propositions; the other is developing the elaboration of a case study. The first strategy is more

successful and was chosen as the framework of the study, and its unique objectives are held on the basis of such proportions to help view the review of literature, acquire new insights and a comprehensive set of research questions (Yin, 2014).

Conversely, the other strategy, known to be the case study description strategy implies the progress of elaborative structure of the case study with the main purpose of its organisation. Yin (2014) averred that this second strategy is less considered than the other one; but, it can be used as a supplementary source on circumstances such as the unavailability of theoretical strategy propositions.

> *"The most complex and least developed phase in regard of a case study is known to be the analysis of case study evidence". (*p.109*)*

Regardless, this research study had been completed on the first strategy based on theoretical propositions which assisted the researcher in concentrating on a focused sub-set of data while identifying the less relevant areas.

4.7.2 Data Analysis Technique

A very helpful element was structured in chapters 2, 3, and 4 before referring to the data collection exercise as it guided the discussion on the framework, data collection, and analytical procedures. Denscombe (2007) put forward some principles that would be useful in a good analysis of qualitative data, and these are as follows:

- The data provided should be prepared and organised in order to start the analysing. The original data need to be saved, protected. Moreover, the data should be catalogued and indexed.
- In the second principle, the researcher is required to prepare for the elaboration of his data after careful examination of the data. This process is referred to as interpretation. The researcher needs to make inferences from the primary data.
- In the next principle, the researcher has to be very cautious about the unwarranted preconceptions occurring in the data analysis.
- In the last principle, an identification number to the primary data material is required in the event that providing references occurs. The format is not very relevant, but it requires every single item to be in its appropriate place.

In 1994, qualitative analysis was categorized into three concurrent flows by Miles and Huberman. The very first step is known as data reduction and implies the procedure of selecting, concentrating, making simple, extracting, and altering the data. Accordingly, the first step is based on summarising the data into its significant form. Subsequently, the next step refers to displaying data which implies that the data should be arranged, compressed to help in deriving conclusions. It also refers to the step of arranging and selecting the data restricted to texts (quotes) or other graphical presentations. The last step is known to be qualitative displays which are required for creativity and uniqueness in analysis to facilitate easy comprehension of the data. Finally, it is the process of coming up with conclusions and verifications on the core meaning of the data (Miles and Huberman, 1994).

This research study utilised certain other data techniques as well, including template analysis, coding and classifications, and an interview guide approach. Miles and Huberman's (1994) concurrent flows of activity along with Denscombe's principles are significant in this study.

As in qualitative analysis, the template analysis (thematic coding or codebook analysis) is extensively utilised, as it concentrates on specific facets or themes of the data (King, 1998). Template analysis was first recognized in the USA by Miller and Crabtree (1992) in the early 1990s. Subsequently, it spread to the UK through the efforts of Nigel King (King and Horrocks, 2010). In 2010, King and Horrocks further elaborated template analysis by stating:

> *"The predictable move arising from the preliminary coding has a different approach in various forms of thematic analysis, despite its imminence to the text to higher order themes where the main core comprises the erection of the coding framework as a template which is afterwards applied to the data and recalled awaiting for the detaining of a complete picture reflecting an analyst's understanding level as much as probable". (*p. 166*)*

In 1998, King stated that template analysis was referred to be a middle thing between grounded theory and content analysis. No previous elaborations of codes are included in grounded theory; whereas, codes are usually encoded and applied to the text in order to engender quantitative data necessary for statistical analysis in content analysis. If content analysis is put into contrast, then the template or initial codes are improved in the enduring analysis after applying it to the text. A code has been defined in 2004 by

King: *"a label is referred to as an accessory to a section of text to index as if linking to a matter or theme present in the data identifiable by the researcher and mark it relevant for his elucidation". (*p. 257*)*

In 1994, Miles and Huberman elaborated template analysis as a method of recognizing the key factors of texts and summarising them into previously given codes and themes. The template resembles the list of codes, or it can be described as *a priori*, as it is based on the previous research study, preliminary scanning of the text, and the theoretical perspectives.

The template analysis is extensively utilised for the purpose of qualitative research. In 2008, Wainwright and Waring described template analysis to be usually applied to qualitative data analysis for the purpose of organisational research. On the other hand, King (2004), King and Horrocks (2010), Crabtree and Miller (1999), and Miles and Huberman (1994) have referred to template analysis as a set of codes that provides a better framework for analysing data and enables the researchers to concentrate on some of the specific facets of the text.

The template analysis technique is preferred, as it goes with some particular processes and enables the researcher to acclimatise in order to match with the objectives and requirements of the research (Horrocks and King, 2010). In 2008, Wainwright and Waring posited a sequence of procedures for template analysis in the steps as follows:

- Creation of code
- Coding of text (applicable for both, hand and computer application)

- Arrangement of text (In order to interpret similar text together)
- The segments are to be read, and afterwards, the connections are to be made.

While initiating the development of codes, King (2004) identified any of the three aforementioned positions as follows:

- A few predefined codes or *a priori* codes are developed in the beginning which are based on the theoretical approach of the research. OR
- The development of codes should take place after the data exploration has moved on to some extent. OR
- A halfway position to be upheld with certain initial codes (most probably occurring from the interview questionnaire) and refinement soon after the data are explored.

In 2010, King and Horrocks (2010) elucidated the use of template analysis more descriptively, such that it does not instruct particular levels of hierarchical coding. While the researchers were working hard to utilise the majority of the levels supportive over capturing and arranging the connotation of the data in 2004, King stated that there are no specific rules for creating a template with the utilisation of prior codes where these priori codes were only used up for initiating. Further, there is the need to modify the researcher's approach for feedback from the interviewees. Thereupon, the priori codes are upheld as the finest indicators in the interpretation of data.

As per this elaboration, the template analysis would seem to be of a deductive approach as it commenced from the chosen predefined codes (initial template),

founded on the topic guide of the interview. The researcher was required to work methodically on the complete set of texts, which further helped develop the template to its final form. Limitations were further discarded from the initial template by creating certain amendments in order to discover better and more reliable codes for the template.

In 1998, King elaborated that the amendments created in the process comprise deletion, changing classification, insertion, changing scope, and so on. In 1997, Hussey and Hussey put forward their viewpoint that the general inferences are provoked from certain specific examples. On the other hand, from the aforementioned conclusions, it is believed that template analysis is more of an inductive approach, as the data analysis is transformed into theory development as per the observation of reality.

A very constructive and useful tool was considered and put into practice with regard to the qualitative data analysis, known as the ’Nvivo’ qualitative software analysis tool, which is extensively used by many qualitative researchers.

The first step in the data analysis constituted the transformed version of audio-recorded interviews into text formats. In the upcoming step, the entire transcribed data were put into the Nvivo database, where these data inputs can be conveniently coded, arranged, and displayed due to the efficient design and structure of Nvivo.

The coding tree flowchart in Appendix D was created for recognising the final structure of the initial template once applied to the rest of the transcripts for more data analysis.

In 1999, Crabtree and Miller elaborated the approach by stating that the coding of text and the coding tree could help facilitate rapid and reproducible coding of texts for people who are doubtful of the effectiveness of qualitative research. It is also specifically appropriate and helpful to the researchers who employ the quantitative approach in their first steps in quantitative analysis.

4.7.3 The *Priori* Codes for the Qualitative Data

Identifying *a priori* codes for qualitative research is critical in describing and interpreting the data. Codes, in general terms, involve marking the segments of data with symbols, descriptive words, or category names. Based on the research questions of this thesis and the literature review in chapter two, and the framework in chapter three, a key set of *a priori* codes had been identified.

Table 4-5: *A Priori* Codes Identified from the Literature

Domain	Themes	Codes
1. Context	Culture	.1 Business understanding IT and its value .2 Organisational culture .3 Motivation
	Learning	.4 Organisational knowledge sharing .5 Training and developing
	Integration	.6 Business and IT linkage .7 Integration among organisational units
	Structure	.8 Organisational hierarchy .9 Top management support .10 Organisational rules and regulations
	Technology	.11 IT/IS readiness
2. Content	Individual	2.1 Skills, knowledge, and experience in IT 2.2 IT project management skills 2.3 Top management leadership type 2.4 Top management trust style
3. Process	Planning	3.1 Role of IT in planning the organisational strategy 3.2 Clear goals and objective 3.3 Role of business in planning IS strategy.

As shown in Table 4-5, the codes emerge from three exploring areas, namely, Knowledge, Experience, and Skills, which are found in the literature. Furthermore, Figure 4-2 shows a the Initial Critical Success Factors (CSF) tree developed based on the research revised framework. The CSF tree explains the linkage between the contextual theory of Pettigrew (1988) and illustrates context, content and process critical success factors. However, the *priori* themes are not definitive; instead, the *a priori* themes should be acknowledged as tentative and subject to redefinition, revision, or removal (King,1998).

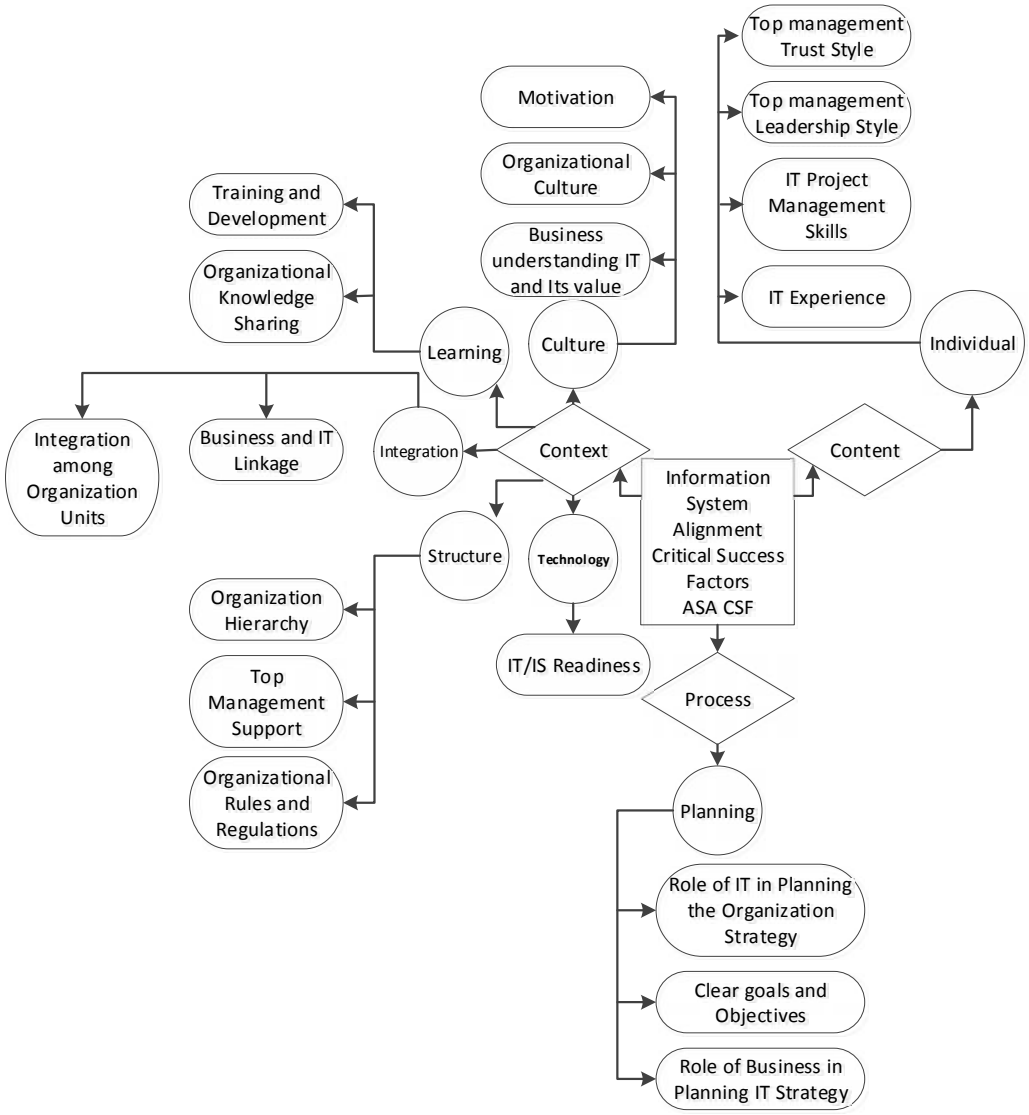

Figure 4-2 Initial Critical Success Factors (CSF) Tree

4.8 Ethical Considerations

This research study would have been deficient if ethical considerations were not given due regard. The researcher had put great efforts to shield the individual participants and their related enterprises from the detrimental effects of the research activities.

Various ethical matters are required to be sorted out within the objective of clear comprehensive research while utilising the interviews embodying the statement of honest views, keeping promises, discretion, and informed consent (Johnson, 2002).

In 2006, Sapsford and Jupp elaborated several ethical requirements as follows:

- Assurance of anonymity and privacy
- The researcher's laptop contains electronic versions of interview notes.
- Ethical approval is attained from the Faculty of Engineering and Environment Ethics Committee.
- The main objective of the research is to make respondents know what they should expect before conducting the interviews.
- The participants are provided with the opportunity to back up their information with the research study.
- The researcher should have the temperament as not to harm the reputation and integrity of the interviewed organisations.
- While the interview notes were reviewed with alteration of interview notes or deletion of undesired portions of the interview questions/notes, the participants should be provided with the chance to withdraw from the research.
- The confidentiality of interviewed enterprises is shielded by conducting the interview in a very private, closed office, utilising anonymised names in transcripts, conducting the interviews far away from the research participants and afterwards to be kept in an electronic file with the original names and

identification of the interviewees in a private and protected folder, accessible only to the researcher.

The researcher had to obtain permission for interviewing the participants and to mention their names as a proof that an interview has been conducted. In this regard, the participants were asked to sign a consent form. The consent form was done in Arabic and English (Appendix B). The researcher kept all the confidential details in his computer. The participants were personally approached prior to the interview proper. Alongside, ethical considerations have been complied with, as follows:

- The participants were provided with certainty, and no risks were assured; a guarantee was provided for the confidentiality of the interview.
- The interviews were recorded, and permission was asked as to the use of a recorder along with elucidation as to how the task would be kept secure and distanced from everyone.
- The respondents had the privilege of helping them articulate their thoughts and opinions.
- Being a doctoral candidate and the researcher's position in the Institute proved to be an advantage to conduct his research on IS alignment.
- When the interview was initialised, the respondent was provided with research objectives in both the English and Arabic languages (Appendix C).
- The respondents needed to sign the confidentiality agreements with all the pertinent terms and conditions after agreeing to be interviewed.

- The participants were provided with an Arabic interview questions list if they preferred to read it (Appendix A).

4.9 Chapter Summary

This chapter discussed and presented the research methods that have been adopted in this study. The use of a preferred qualitative approach has been explained and justified. In addition, the chapter has discussed the particular design of interviews that have been used. Furthermore, this chapter explained and provided a research design rationale for the use of an exploratory single case study. The data collection strategies of this study are described within this chapter as with full contextual background and data provided. Examples of the entire data analysis methods have been exhibited and discussed. The overall research design and the updated conceptual framework has been explained based on the research objectives, questions and problem defined.

Chapter 5: The Case of the Kuwait Institute for Scientific Research: an SR&D Organisation

5.1 Introduction

This chapter presents a brief discussion of Scientific Research and Development (SR&D), then a background description of a case study of a research and development organisation.

From a national perspective, a background discussion of Kuwait is included in this chapter to present a picture of the interplay of the external contextual environment, as against the internal forces (internal contextual environment) within the case organisation, the Kuwait Institute for Scientific Research (KISR).

KISR, as referred to in this study, was used as the major case organisation in order to determine answers to the research objectives, and whether, as an exemplar of SR&D organisations, it has been able to perform better than its counterparts in matters of arriving at a more focused and strategically aligned use of IT. Therefore, the study utilizes a single exploratory, but rich in terms of organizational access to data, case study, where KISR stands as the big umbrella, under which there are 4 scientific centres based on divisions of research areas, each taken as a sub-case study prototype in itself, each centre, is therefore considered as a sub-case study which is

interdependent within KISR, taken as the overall unit of analysis for the research study.

It was also necessary in the discussion to be more detailed in presenting each centre, the challenges faced, the research thrusts, vision, goals, as well as the manner in which they relate to the country's development in the respective fields. Briefly, strategic planning at KISR is also discussed and a concise historical description of KISR itself.

For the benefit of this research, and with consideration of the case study institute used, being of a multidisciplinary institute of varied scientific fields, the term used throughout this research study is not confined to just the term R&D, but more specifically SR&D with the case of KISR as an SR&D organisation.

5.2 Research & Development (R&D)

R&D refers to the investigative activities and business, coordinating in order to enhance products and procedures or to cause the development of new products, new knowledge, procedures, as well as services. In Europe, this is known as research and technological development (RTD).

Activities within R&D differ from one company to the next, but standard primary models have been identified. R&D is widely linked to experimental design, product and service innovations which is what scientific institutes advocate.

R&D is also defined as a systematic activity combining both basic and applied research and is aimed at discovering solutions or creating new products and knowledge. It is imperative that a company or an organisation should have strong and vigilant R&D to come up with new innovative products. It also aims to create new technology or information that can improve the effectiveness of products or make the production of products more efficient.

Two basic R&D structures have emerged in organisations throughout the business system. One department is primarily handled by engineers who develop new products, a task that typically involves extensive research. Another model is composed of industrial scientists or researchers, all tasked with applied research or technical or industrial fields aimed at developing future products or improvements of current products and/or operating procedures.

R&D is distinct from corporate activities in that, it is not often to generate profit at an immediate level, at best, risky and is not always having its return of investment. Incidentally, the level of capital risk increases, as more is spent on R&D.

5.3 R&D Strategy

The competitive environment is as fierce as ever. Companies have found it difficult to meet their targets, such that they can generate more income. A source of competitive advantage is R&D. Through R&D, it is important that production of

innovative products and new technologies can lead to improvements in operation and productivity growth.

However, despite its relevance and importance, R&D is not always aligned with the overall organisational and business strategy. Often 'isolated' or way too focused on the day-to-day activities of the organisation and too often constrained along short-term economic goals that have led to an unsustained strategic impact on the organisation. This runs parallel to that stage where alignment was regarded as procedure and not as an occurrence (Broadbent, 1990; Henderson and Venkatraman, 1989, 1993; Broadbent and Weill, 1993) . This claim for alignment research as a procedure, rather than an occurrence, is indicative of it, being 'mechanistic' in nature, too theoretical, and fails to capture real-life occurrences. Besides, strategic alignment is not guaranteed to succeed in the world of work, because strategy is not a clear concept due to volatility in the work environment that often leaves managers in confusion (Vitale et al., 1986).

Be that as it may, there lies the need for linking R&D to organisational strategy and to maximise returns on its R&D efforts. One prevailing solution is to set a technology management architecture that can help the organisation link R&D to its organisational strategy.

Two main practices are involved in the setting up of a technology management architecture, namely, a technology planning practice built on a technology agenda that responds to the strategic challenges of the organisation. The second is an R&D

portfolio management practice maximising on the value from R&D investments, optimising prioritisation, resource allocation, and risk management. Supporting elements such as a proper governance structure, i.e., the leadership, processes, and tools, a set of indicators and metrics, technology intelligence activities to provide insights for technology planning, and the business strategy and mechanisms for effective collaboration between internal and external stakeholders, among others, should be considered.

These elements should be customised in relation to the culture of the organisation and its specificities.

What is the strategic intent for R&D in the organisation? This question is better answered by establishing a clear and explicit R&D mission and the scope of its activities. What are the objectives, the resources needed, priorities, and identification on the means to execute the strategy? Should it be dedicated to process development or new product development? Which markets should be prioritised? These may be conflicting questions, but at the end of the day, answers would depend on the technical leaders, the scientists across frontal areas, and business units.

Along this view is a consideration of technology road mapping, which is a tool that translates market trends and drivers into product requirements, subsequently, into technology needs for an effective and efficient technology transfer. This would help develop a prospective view on technologies and markets, as well as to define an agenda of potential R&D products.

As well, an R&D portfolio management practice is a must to formulate a folder of projects in harmony with the organisational strategic priorities, achieved through well-defined criteria for analysis and selection of projects and programmes of action towards a clear picture to aid in the decision making process.

In this regard, the importance of a proper governance structure cannot be over emphasised with the leadership endowed with a set of organisational structures, decision making forums, and a clear definition of roles and responsibilities within the organisational structure and units and a cooperative and collaborative endeavour of R&D and business-driven areas, to include also the Marketing aspect (Pereira et al. 2014).

In essence, R&D effectiveness comes from strategic alignment.

KISR as a government-funded scientific R&D organisation, geared to applied scientific research is focused on developing new knowledge, products, and services for effective and efficient technology transfer activities.

5.4 A Brief Historical Description of the Kuwait Institute for Scientific Research (KISR)

KISR was initially established in 1967 under an oil concession agreement with the Arabian Oil Company Limited (Japan) in fulfilment of the Japanese company's obligations with the Government of the State of Kuwait. The Institute was primarily

established to carry out applied scientific research in three fields, namely, petroleum, desert agriculture, and marine biology.

Subsequently, KISR was officially organised by an Amiri Decree issued in 1973, under which, it became directly responsible to the Council of Ministers via its Board of Trustees. The main objectives of the Institute, as specified in the Amiri Decree, were to carry out applied scientific research, especially related to industry, energy, agriculture, and the national economy, to contribute to the economic and social development of the State, and to advise the Government on the country's scientific research policy. An Amiri Decree in 1981 (Law No. 28) formally declared KISR as an independent public institution.

The 28/1981 Law stipulated that KISR would be governed by a Board of Trustees chaired by a Minister chosen by the Council of Ministers. The revised objectives of the Institute are stated as follows:

- Conduct scientific research and studies concerned with the progress of national industry and which facilitate the preservation of the environment;
- Encourage Kuwait to practice scientific research and nourish the spirit of research in the younger generation;
- Explore and study natural resources and means for exploiting them, including energy and water resources, and methods to improve agriculture and develop aquatic resources;

- Render scientific, technological, and research consultation services to the government and to national establishments;
- Follow up the development of scientific and technological progress, and adapt it in ways that conform with the local environment;
- Establish and foster relations, and carry out mutual research with higher educational institutes and the technological and scientific sectors in Kuwait and various parts of the world; and
- Participate in the study of ways to verify the resources of the national economy by investing the results of scientific and technological research in industry, and directing it in the services of the State's economic and social development goals.

The 28/1981 Law also entrusted KISR with undertaking research, scientific, and technological consultation for both government and private institutions in Kuwait, the Gulf region, and the international research community.

5.4.1 An overview about KISR

The primary role of the Kuwait Institute for Scientific Research (KISR) is to deploy applied scientific and technology based solutions to public and commercial challenges for the benefit of clients, partners and the Kuwait people.

KISR has identified critical areas of great national importance and established semi-autonomous research centres in Petroleum, Water, Energy and Buildings, and

Environment and Life Sciences. Each research Centre's strategy is developed around programs specifically aligned with national challenges. Within each of programs are several solution areas with projects chosen to support, through directed research, the development of innovative products and services (KISR, 2016a).

The laboratories at KISR are an integral part of the research carried out by the institute with regard to project, patents, analytical services, consultancies and general research activities. They are also utilized for the on the job training of KISR's staff as well as in the training of university and high school students enrolled in KISR's annual training programs. The laboratories are managed and operated by KISR's research centres. The total number of these laboratories is around 57 and they contain and utilized international procedures (KISR, 2016a).

To facilitate the research activities conducted by KISR's four research centres, the institute has established different facilities across Kuwait. These are located at Shuwaikh, Doha, Salmiya, Shagaya, Kabd and Ahmadi (KISR, 2016a):

- Head Office in Shuwaikh: the site includes the offices and main laboratories of KISR, as well as KISR's new building, which represents a unique structure and architecture.

- Doha Desalination Research Plant: the plant was established as part of KISR's efforts to expand its desalination capacity in order to cope with the increasing demand from rapid population growth.

- Aquaculture, Fisheries and Marine Environment in Salmiya: the site is where all research on marine biology, mariculture and fisheries in conducted.

- Bahith 2: A research vessel operated by Environment and Life Sciences Research Centre to conduct marine surveys and project oriented research.

- Petroleum Research Centre in Ahmadi: Research, support, training and consultation serving the oil sector in Kuwait are housed in this facility.

- Kabd Experimental Agricultural Station: Researchers study problems of agriculture and plantation, and explore crap variations, soil testing and other advanced technologies used to promote sustainable farming and agriculture. The station is about 40 km2 and represents the field site for testing of plants, animals and poultry. It also hosts the investigation of agronomic practices for increased plant production, optimization of feed rations for livestock and poultry, demonstration of greenhouse agriculture, modern irrigation system and field laboratories for soil, water and plants. Half of the station's area is allocated for protection of the native plants and biodiversity.

- Shagaya Renewable Energy Complex: A multi-technology project aimed at using different forms of renewable energy platforms, incorporating wind turbines and solar power plants.

- Sulaibiya Sewage Treatment Plant: This is the world's largest commercial pilot wastewater treatment plant, operating with a capacity of 600,000 m3/d, based on twin-membrane separation.

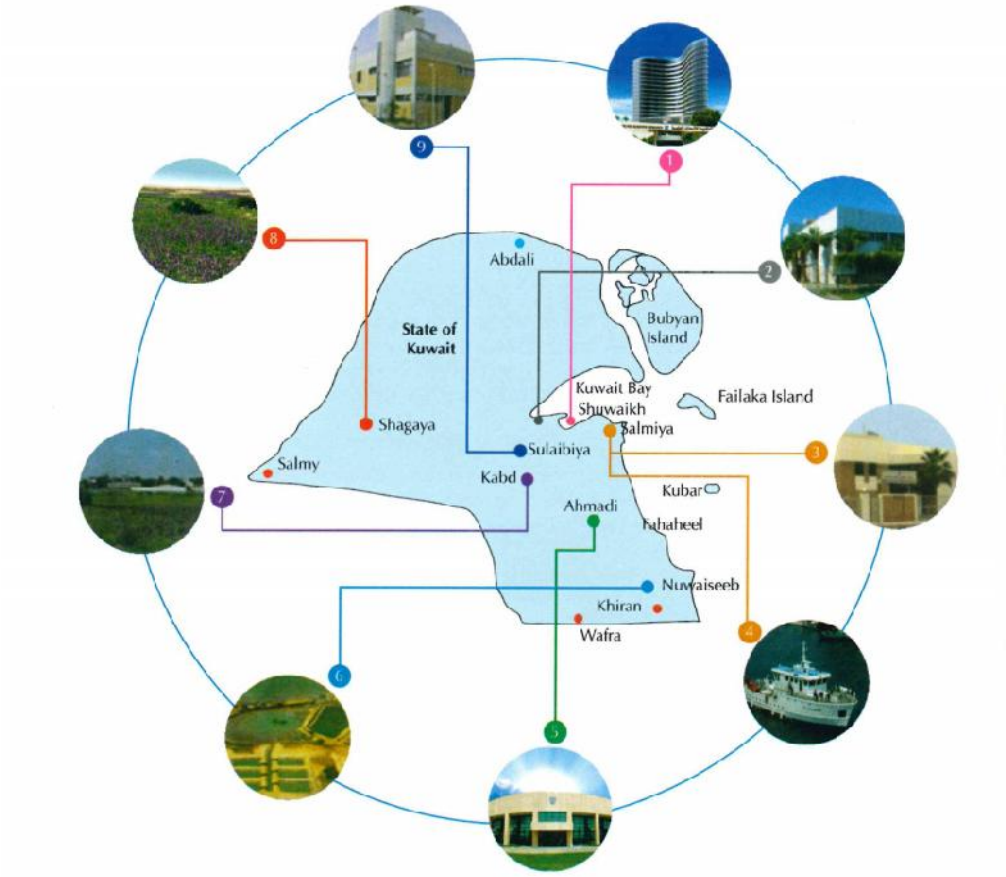

Figure 5-1: KISR Research Facilities Locations (source: KISR, 2016b)

All KISR Facilities are operated by 1435 employees. The number of Kuwaiti manpower is 697; non-Kuwaitis number to 162. The temporary manpower (contractors) consist of 576 employees. The institute hosts 241 Researchers, 470

Professionals, and 74 Technicians. Moreover, the top management (Leaders) includes 5 Persons; Managers (26) and 17 Section Heads.

Strategic plans needed to be formulated for a better understanding of the strategic alignment process and how to be particularly relevant to the restructuring of the internal context *vis-à-vis* the external environment which KISR likewise serves.

In order to achieve KISR's objectives, strategic planning has adopted and programmed the research vision and thrusts via its strategic plans as follows:

- The Re-establishment of the Institute Plan (1976-1978).
- The First Strategic Plan (1979-1984).
- The Second Strategic Plan (1984-1989).
- The Third Strategic Plan (1990-1995).
- The Fourth Strategic Plan (1995-2000).
- The Fifth Strategic Plan (2000-2005).
- The Sixth Strategic Plan (2005-2010).
- The Transformation (2010-2015)

5.4.2 The Re-Establishment of the Institute's Plan (1976–1978)

In 1976, KISR published a two-year working plan involving three major steps, such as developing human resources, establishing the research facilities, promoting

research that could contribute to enhancing the image of the Institute in the Kuwait society, and creating a structure for the Institute as a whole.

5.4.3 The First Strategic Plan (1979–1984)

The Institute prepared the first strategic plan from the output of the First National Symposium on the Application of Science and Technology, which was held on May 6–7, 1978. In this plan, the research activities of the Institute were organised under the umbrella of five scientific programmes, namely, Engineering, Earth and Environmental Sciences, Food Resources, Petroleum and Petrochemicals, and Techno-Economics. One of the objectives of the plan was to develop an operating manual relating to the various organisational units. The plan was focused on building and developing the national cadres. Before adopting this plan, a survey of government and industrial opinions was gathered, from which results were based the project thrusts of the Institute.

5.4.4 The Second Strategic Plan (1984–1989)

The Second National Symposium on the Role of Science and Technology in Development was held from January 29–31, 1983. It was from the outputs generated from this symposium that the Second Strategic Plan was derived. KISR management formed an international committee to look into completed researches and the Institute's achievements based on the objectives set within the First Strategic Plan and

to explore national research objectives in future undertakings. The committee worked for two weeks during which time, they met with distinguished members of the government, the Legislative Council, and some managers from the private sector. The committee's work was focused on technical matters dealing with the review of performance related to the past strategic plan, in order to consider what the second strategic scheme would be. This plan was extended for one more year to coincide with the country's development plan.

5.4.5 The Third Strategic Plan (1990–1995)

This strategic plan was created after having conducted an internal assessment of the performance of the previous strategic plan. The new plan defined six scientific areas of research; those of the previous plan plus a water research program. This plan was interrupted because of the Iraqi subjugation in August 1990 which brought forth aggressive behaviour of damaging even that of the resources, capabilities, and scientific infrastructure in the country, represented by KISR and other emerging scientific bodies.

5.4.6 The Short-Term Plan (1991–1992)

From the early days of the liberation, KISR took the lead in preparing and implementing development plans consistent with the country's research needs and demands and made good use of the financial capabilities of the country in terms of

rebuilding and reconstructing laboratories and other research facilities. In this plan was incorporated a number of objectives aimed at coordinating with the government in order to mitigate the environmental damage and to restructure research in the country.

5.4.7 Research Transition Plan (1992/1993–1994/1995)

The country's situation after the Iraqi invasion called for a transition in almost all aspects of Kuwait life. The third strategic plan was supposed to cover this period, but it could even be said that the short-term plan worked to KISR's advantage in terms of reconstruction activities, which prompted KISR to adopt a transitionary approach, focused on the rehabilitation of ecosystems, and also on implementing measures to continue with previous research commitments, and strengthening the role of the Institute as a consulting body to all sectors in the country. This plan was reviewed by a scientific committee composed of local leaders and experts with the experience learned from other countries.

5.4.8 The Fourth Strategic Plan (1995–2000)

In the early 1995, a symposium was organised participated in by a pool of bright minds, prominent researchers in varied scientific disciplines, and clients. The purpose was to evaluate and assess the performance of the Institute from the set of objectives and tasks integrated in the previous plan, and likewise to come up with the next

strategic scheme for KISR. The fourth strategic plan was then formulated and presented to a scientific body, composed of local and external members who were not part of the KISR system. The observations and recommendations from this scientific committee harboured on a call to promote the matrix system, to cooperate with the local scientific institutions, seek to ensure the availabilities of a minimum of foreign expertise, achieve the optimal use of resources, audit the accounting system for the projects, and establish a database for completed researches and studies.

5.4.9 The Fifth Strategic Plan (2000–2005)

The fifth strategic plan signalled, not only on setting the objectives, thrusts, and activities centred on research, but also on the technical and support departments of the Institute. Through this scheme, KISR could very well determine how every department and unit could contribute, both as an individual entity and joint groups, blended together in order to accomplish the stipulated goals of the Institute. In essence, it was more like a holistic approach towards the accomplishment of the projected thrusts of KISR.

Three strategic goals were highlighted in the plan, namely, scientific research, scientific consultations, and development of IT, organisational scientific structure, and a more enhanced media relations towards creating a favourable image for KISR in the society. During the period, an analysis of the strengths, weaknesses, opportunities,

and threats (SWOT) was done by a foreign scientific institution, and the results of the analysis were compiled in a submitted report.

The plan was concentrated on three main axis as follows: the first one was related to the development and research programmes. The second axis included concentrating on providing services and technical consultations for major national industries, public institutions, private sector, and regional and international organisations. The hub of the third axis was on developing skills and increasing experiences of leaders in the Institute through general and specialised training courses and widening the various training programmes. The plan also included important instructions regarding common activities such as developing the scientific research infrastructure, use of IT, proper administrative organisation of scientific research, and the application of scientific awareness programmes in order to support and develop the relationships between the Institute and the Kuwait society as a whole.

5.4.10 The Sixth Strategic Plan (2005–2010)

The sixth strategic plan covered an evaluation of the previous plan's achievements, determining productive and service sectors' needs in the sciences and technology fields, assessing the scientific quality for research outputs that were achieved in the fifth strategic plan, as well as upgrading the transparency level by creating awareness in the employees and staff of the Institute's strengths and weaknesses, as well as the

risks and opportunities within the institution. In addition, it included the main country plans of social and economic development.

Prior to the actual sixth strategic plan formulation and implementation, there were studies and reports done. Modifications on the fifth strategic plan were reported; a background study was conducted on the different sectors' needs in the field of science and technology from the national level; observations were made on reality and future prospects in the preparation of the sixth strategic plan, along with the achievements based on the fifth strategic plan; and a SWOT analysis was done to provide insights on what was to be modified, improved, and excluded in the framing of the next strategic plan.

The sixth strategic plan underwent three stages. The first stage was completed in three levels, namely, performance and achievement evaluation of the previous strategic period; determining the scientific quality of the projects from the perspective of external experts in their own respective areas; and the third was bringing into the Institute's fore international consultants to study the Institute's mechanisms and programme structures.

The second stage of the planning constituted looking into the needs of KISR's beneficiaries via worksheets for each service section, incorporating therein the oil sector, state sectors, and related institutions, public and the society's interests, and the country's trade and industry sectors.

The worksheets from each identified beneficiary came up with information on their respective general status, the completed projects relative to their needs, their acquired knowledge and experiences from the results of the research projects, technology application and use from the lessons and experiences derived, and their visions for future projects, consultation, and prospects from the Institute.

The third stage basically included the framing of the plan's objectives and the performance index; the fourth stage constituted the final draft of the policies and programmes for discussion until final approval and a timetable was set for action.

5.4.11 The 7th Plan (2010–2015)

The Transformation period, Re-Engineering the Kuwait Institute for Scientific Research; came about due to an urgent need to mitigate the deficiency in the implementation of the Sixth Strategic Plan. Apparently, the plan was very well-framed, well-designed, and looked good on paper, but was never implemented as expected in reality. While the planning underwent developmental phases and may have been treated from a top-down approach, the outcome was not altogether favourable to the Institute. The IS component was not so much given emphasis; hence, alignment during this particular phase would more likely be in congruence with the argument, posited by Broadbent (1990); Henderson and Venkatraman (1989, 1993); and Broadbent and Weill (1993) that IS alignment is more of a procedure, rather than an occurrence. As Vitale et al (1986) put it, in reference to KISR's experience,

strategic alignment is not guaranteed to succeed in the world of work, because strategy is not a clear concept due to volatility in the work environment that often leaves managers in confusion and in a muddle.

The 7th strategic plan of KISR is a new and improved concept of applied science, envisaged in a transformation project on an institutional level. To meet the needs of key stakeholders, while developing KISR into a truly world-class research institution, the Institute conducted a series of analyses, which led to identify multi-programme research and technology centres as the optimal structure. These analyses also identified where KISR capabilities and aspirations could best be in interconnection with the top priority needs of Kuwait and the region. In effect, this resulted to the organisation of KISR's research and technology capabilities into four centres as follows: the Petroleum Research Centre, the Water Research Centre, the Energy & Buildings Research Centre, and the Environment & Life Sciences Research Centre, and the division called Techno-Economics. The main aim of the transformation project is to reflect KISR's commitment to facilitate the use of best practices in managing its core research activities, to strengthen capacity building, and to project leadership as a science and technology centre of excellence in the region. Furthermore, KISR aims to accomplish much because of the abilities of its dedicated research staff, who have continuously made it one of the most important scientific research centres in the Arab region.

There are three fundamental changes in KISR's new planning approach. Firstly, the focus was placed externally on understanding and falling in line with Kuwait's

national priorities and key clients' needs in developing KISR's Science, Technology, and Innovation (STI) agenda. Secondly, KISR's STI agenda was thoroughly reviewed by multiple clients, external stakeholders, international consultants, and strategic alliances. Thirdly, over 500 KISR staff at all levels of the organisation have participated in the planning process, resulting in a shared vision, expanded mission, focused strategy, new organisation, and a set of values to drive behaviour.

- **Critical Observations Relative to the Transformation**

This researcher, on personal observations, was prompted to base his analysis of the prevailing transformation regime on the basis of an alliance with a business re-engineering process, which has been used by researchers as a technique in IS alignment with organisational strategy. According to Pollalis (1996), alignment of the IS plan with the organisation plan is one of the goals of business process re-engineering; whereas, Lockamy and Smith (1997) argued that strategic alignment framework is needed for effective business process re-engineering projects. Earl et al. (1995) insinuated that a working framework is needed in order to link strategic planning with business process re-engineering to include incorporation of an organisation's strategy, processes, and its IT. Imperative in the process is an understanding that one of the key management issues is the organisational culture, particularly, the organisational behaviour is thought to produce the organisational culture. Three levels were proposed by Schein (2010) by which an acceptable organisational framework can work in this re-engineering process, as follows: artefacts, which serve to be the uppermost level comprising observable structures and

activities; espoused organisational values such as the goals, philosophies, and strategies; and fundamental assumptions, embodying the innermost level such as feelings, views, and beliefs held by organisational members, but which are however, taken for granted. This kind of organisational culture is used by individuals in the organisation, not merely for comprehending what is going on, but also in responding to these happenings, consciously or unconsciously, which again are determined by certain factors, either enabling or inhibiting them from exercising their roles and responsibilities efficiently and effectively.

The likelihood is that organisational culture has to be modified and given due recognition and regard by the leadership such that this culture of the Institute can serve as a determinant of success in the acquisition of IS alignment. For this purpose, brief descriptions of the Centres, and the division, are here discussed.

5.5 Description of Petroleum Research Centre at KISR

The Petroleum Research Centre (PRC) of KISR was originally referred to as Division of Petroleum, Petrochemicals, and Materials. As a division, it was established in 1967, with the aim of conducting research and providing consultation services and technical support to local industry. Over the past 30 years, the PRC (as it is now called, given its new name in 2000), has been providing technical support to the petroleum production and refining industries and developing innovative solutions in such areas as catalysis, petroleum chemistry, and specialty chemicals. It has since maintained a

good working relationship (backed up by agreements and memoranda of understanding) with the Kuwait Petroleum Company (KPC), the Kuwait Oil Company (KOC), and the Kuwait National Petroleum Company (KNPC).

5.5.1 Vision and Mission for the PRC

By 2030, the PRC envisions international recognition as a centre of excellence for the development and application of innovative technologies for enhancing the productivity and performance of the petroleum and petrochemical industries in Kuwait and in the region.

The PRC will focus its efforts on the key challenges facing the oil production, petroleum refining, and petrochemical industries. It will work, in particular, towards developing solutions to enhance oil recovery, develop heavy oil production, upgrade technology, optimise and improve the flexibility of petroleum refining activities, and support the growth of the petrochemical industry. It will partner with local and regional companies, foster strong linkages with leading international science and technology institutions, and create a national workforce for the petroleum industry sector.

5.5.2 Kuwait's Challenges in the Area of Petroleum

Crude oil and gas represent the main sources of energy and raw materials for the State of Kuwait and the Gulf region. Petroleum is critical to Kuwait economy and its quality of life, as it makes up more than 95% of the country's Gross Domestic Product (GDP) based on Eltony (2012). It is also essential for electricity generation, water

desalination, and the provision of raw materials for the refining and petrochemical industries in Kuwait.

The petroleum industry in Kuwait must be prepared to address numerous important challenges in the future, such as aging oil fields, deteriorating crude quality, increasing global demand for oil, continuing concern for the environment, governmental regulations and policies, higher consumer expectations for fuels and fuel delivery systems, and last, but not the least, global competition. Technology research and development will be needed to meet these challenges and maintain the health and profitability of the oil sector.

Based on these expected challenges, KISR's upper management and key external stakeholders targeted the petroleum sector as a key sector for support, with the goal of transforming the current PRC into an internationally recognised centre of excellence for the development of oil upstream and downstream technologies.

5.5.3 Programmes to Address the Challenges

As part of the development of key focus areas for the PRC, KISR has selected six Applied Research (AR) programmes, setting the goals and objectives, as well as the research and technology needs for each programme. The programmes are intended to develop new technologies that will impact both the upstream and downstream industries and enhance the PRC's capacity, which will enable the Centre to provide more advanced technical development and support activities to the oil sector.

The programmes were selected based on the high score of the attractiveness of the technology challenges to the oil sector and their fit with the current or potential capabilities of the PRC. Other challenges, such as those related to environmental issues or water, are addressed by the AR programmes of other centres.

Other potential programme areas, such as optimising gas condensate, were developed only to the concept stage, but not into a full programme, as they were not prioritised; albeit, these will be addressed in the future.

The six programs are as follows: Enhanced Oil Recovery, Heavy Oil, Refining Capacity Expansion and Flexibility, Optimisation of Petroleum Refinery Processes, Corrosion Assessment and Mitigation Technology, and Polymeric Products Enhancement and Customisation.

5.5.4 PRC Organisational Structure

The organisation of the Centre will follow the structure agreed on as part of the KISR Transformation Project High Level Organisation and Governance Recommendations. The PRC includes six programme supervisors and a manager for Technology Development and Services (TDS) activities, and they will report directly to the Director of Technology. The PRC will initially need two researchers to act as Resource Coordinators (RCs), and will assess the need for an additional RC for petrochemicals, once capabilities are developed through the PPEC programme. Figure 5-2 shows the PRC organisational structure and governance.

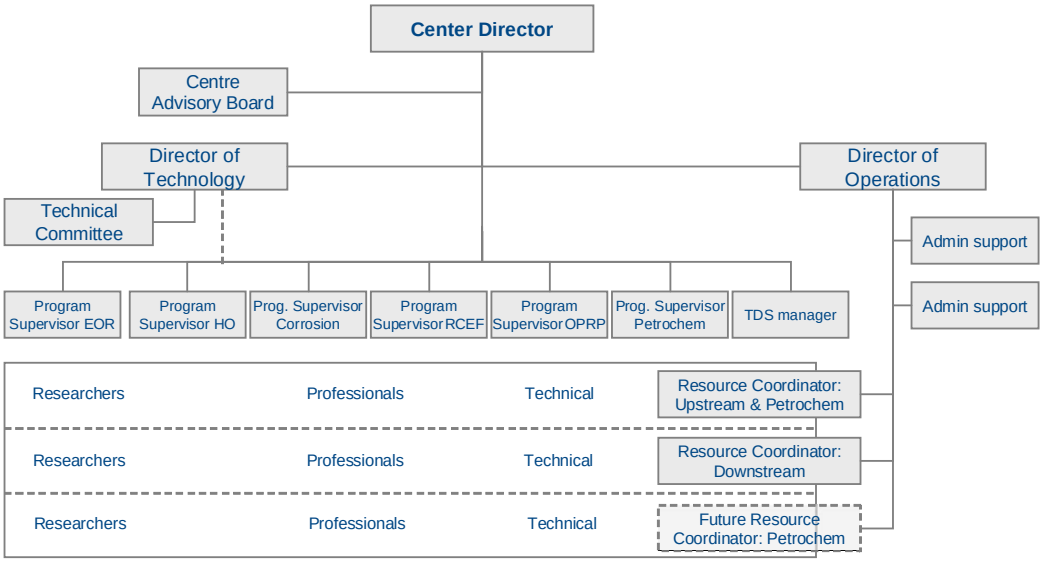

Figure 5-2: PRC organisational structure and governance (source: Little, 2009)

5.6 Description of Energy and Building Research Centre (EBRC) at KISR

The EBRC was originally referred to as a division under the name 'Environment & Urban Development'. The mission of this division was then to engage in research and development that identifies and applies appropriate technological advancements and conservation principles for the enhancement of the urban infrastructure and the protection and enhancement of the natural environment. The new KISR Energy and Buildings Centre aims to build on extensive research conducted in KISR to address a focused set of challenges that have been identified as vital to Kuwait.

5.6.1 Vision and Mission for the Energy and Building Research Centre

The EBRC acts as a foundation for the development of two independent centres that will grow to stand-alone status. It has been envisioned that the EBRC be regionally and internationally recognised, for the excellence of its technology and for its contribution to solve critical problems of the region and the world. Moving towards 2030, based on the maturity of the energy and building research activities, consideration will be given to potential separation of the EBRC into two independent centres.

The EBRC will have local and international recognition for its innovative solutions in reducing per capita energy consumption by implementing energy-efficient technologies in buildings, power stations, and industries, and for its innovative solutions in renewable technologies and applications. The Centre aims to improve the energy efficiency of Kuwait power stations by 5%, reduce energy consumption by 10% in existing buildings and industries, and by 30% in new buildings, and to facilitate the introduction of renewable energy on a significant scale into Kuwait's generation mix. The Centre will also be among the region's pre-eminent organisations focused on the issues of buildings and infrastructure in harsh climates, with integrated programmes of research and consultancy for preserving and protecting the functional performance of structures. Through partnerships with other leading research organisations, the Centre will have for itself, a pool of expertise and will be a magnet for talent and excellence.

5.6.2 Kuwait's Challenges in the Area of Energy and Building

Kuwait has a very high energy demand per capita, and currently generates all of its energy from oil- or gas-fired power stations. In common with other Gulf countries, the per capita energy generation and consumption tend to be among the highest in the world. At present, local energy consumption, excluding feedstock for refineries, is estimated at 15% of the national fossil fuel production.

Despite this high consumption of oil, high demand in some recent summers has led to severe power outages. Based on projections from the Ministry of Electricity and Water (2012) by 2030, Kuwait's energy demand is expected to be almost triple that of today, and the supply of fossil fuel needed to meet this demand will not be sufficient to maintain an acceptable level of social and economic growth in the country. Additionally, Kuwait must mitigate the adverse impact of CO_2 emissions and other pollutants on the environment.

Furthermore, reduction in building energy consumption and smoothing peak demand are important for the overall reduction in the country.

The implementation of a comprehensive energy program to reduce fuel demand—especially through reduced energy use in buildings—and to diversify and supplement sources of energy is therefore, a significant economic measure for the country.

Added to the role of the sector in energy issues, the construction and building industry in the Arabian Gulf region is considered to be the second largest contributing sector to the economy of the Gulf Cooperation Council (GCC) states after the oil and gas

industry. In 2009, Kuwait invested the equivalent of US$2.65 billion in the construction sector, a contribution of 2.10% to Kuwait's GDP (Eltone, 2012). Approximately 70% of the capital investment in the building materials industry is in the cement and concrete industries and their products. This occupies 52% of the labour force and 48% of the total number of factories, which demonstrate the sector's vital role in the growth of the national economy. The construction and building industry is characterised by its huge capital requirements and high energy consumption. It serves to advance the most crucial sectors of development in Kuwait, such as oil installations, power and water desalination plants, housing, roads, ports, and communications.

Both Kuwait's infrastructure and buildings suffer from premature deterioration as a result of the harsh environment. This deterioration leads to a lack of serviceability that may result in serious safety problems. The service life of buildings and infrastructure systems in Kuwait is therefore, considerably shorter than for other countries. Moreover, Kuwait has a sizeable inventory of aging infrastructure assets that require rehabilitation or reconstruction in order to meet performance requirements under the anticipated increase in demands.

Buildings and infrastructure systems may be subjected to various types of hazards and degradation mechanisms that impact their life expectancy. Maintaining safety and managing associated risks require the performance of proper reliability and risk assessment and analyses in order to make appropriate decisions.

The sustainability of structures and infrastructure systems includes the comfort and health of the user and the preservation of the environment and the ecological system, along with cost minimisation over the whole life cycle. Assuring sustainability therefore, is of great importance to Kuwait environment, economy, and its residents.

5.6.3 Programmes to Address the Challenges

As part of the development of key focus areas for the EBRC, KISR has selected six AR programmes and has set the goals and objectives, as well as the research and technology needs, for each programme. The programmes fit with the critical issues of managing demand by improving energy efficiency, diversifying supply by introducing new generation capacity, developing the core building materials, and handling the issues of risk and reliability as applied to buildings and infrastructure systems.

Through the developed programmes, KISR will take a leadership role in the professional implementation of state-of-the-art research, in technology transfer and adaptation processes; in improving the performance of current and developing alternative/advanced infrastructures, energy technologies, and construction and building materials; and by assessing, improving, and developing resilient sustainable systems.

In addition, the Energy and Buildings Centre will continue to provide select technical development and support activities to public and private sector players in the relevant industries, where the requirements align strongly with KISR's capabilities and strategic direction. These activities are expected to become more advanced and will

be based on newly acquired know-how, as the applied research programmes are implemented.

Following the initial five-year programme, the EBRC will have achieved significant research strengths in certain areas within the Centre and will have generated sufficient intellectual capital to contend as a national and regional provider of research and development (R&D) and technical services. At this point, the programmes will be assessed according to their successes and a reconsideration of the needs of Kuwait, and extensions or follow-up programmes will be agreed upon.

It should be noted that there is a variety of expertise across KISR that can be applied to these challenges, as well as to other aspects relevant to energy, nanotechnology, nuclear applications, and construction, including those in other programmes (such as environmental issues). Where this is the case, researchers will work across centres; this will be facilitated by the creation of discipline groupings across KISR as follows: Energy Efficiency Technologies Programme, Innovative and Renewable Energy Research Programme, Infrastructure Risk and Reliability Programme, Optimisation of Petroleum Refinery Processes Programme, Corrosion Assessment and Mitigation Technology Programme, and Polymeric Products Enhancement and Customisation Programme.

5.6.4 Energy and Building Research Centre Organisational Structure

The organisation of the Centre follows the structure agreed on as part of the KISR Transformation Project High Level Organisation and Governance recommendations.

The EBRC includes six Programme Supervisors (PS) and a manager for TDS activities, and they will report directly to the Director of Technology. The Centre will initially need two researchers to act as RCs.

Figure 5-3 presents the EBRC organisational structure and governance.

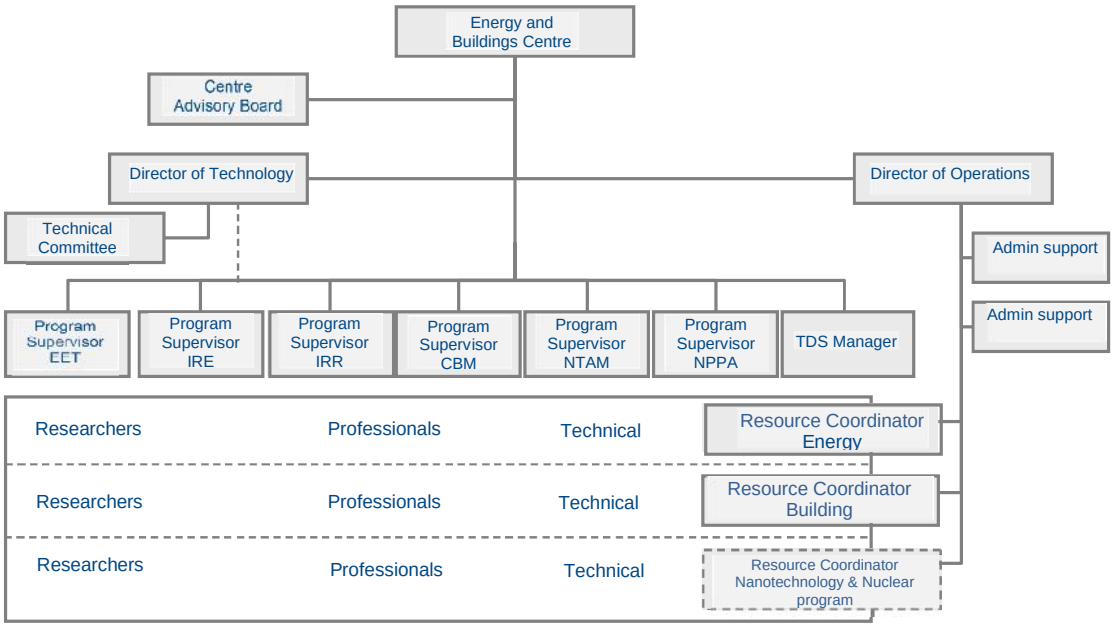

Figure 5-3: EBRC organisational structure and governance (source: Little, 2009)

5.7 Description of the Water Research Centre (WRC) at KISR

The WRC builds on the extensive water research conducted by KISR over the past two decades to address a focused set of challenges that have been identified as vital to Kuwait.

5.7.1 Vision and Mission for the Water Research Centre

By 2030, the WRC will be recognised as an international leader in understanding and applying technology, policy, and management to meet the challenges of water treatment and management in arid environments, and especially to enable the long-term sustainability of Kuwait water resources and industry. The expertise and capabilities developed will be in demand in the GCC countries and beyond.

As such, the WRC will focus on innovation and the development of treatment and desalination technologies, on applied research into the dynamics, use, and management of groundwater, and on policy and technical advice for sustainable long-term management of Kuwait's natural water resources. It will be a trusted partner of ministries and companies across the region, as well as international research and technology institutions.

5.7.2 Kuwait's Challenges in the Area of Water Resource

In Kuwait, the total per capita water consumption increased from 40 to 130 gal/d between 1970 and 2008 (UNDP, 2010). At the same time, the population grew over three times, leading to a more than tenfold increase in water consumption. Kuwait has

the lowest renewable natural resources in the world and meets most of its freshwater requirements through the desalination of seawater, which is expensive due to the necessary capital and operating costs for desalination plants. The combined cost of electricity and water provision is the highest among the government's expenses, and it is projected to consume over a third of the GDP in 2025.

These facts have raised numerous questions about the sustainability of such a rate of growth, and the possible adverse effects that such increased consumption may have on the economy and the environment of Kuwait. Optimally, water resource managers should find a match between resources and consumers, while maintaining the socioeconomic and environmental standards. As it stands, the water allocation in Kuwait is far from such a level of integration, which leads to a significant wastage of resources and an undesirable impact on the environment. The country depends on desalination plants for most of its freshwater needs, but in case of an emergency, when desalination plants may be out of commission, the available reserve of freshwater will only meet the demand for approximately ten days. Groundwater is the main naturally occurring water resource in Kuwait, providing 36% of Kuwait's annual water supply, including 90% of the water used for irrigation and the greening of Kuwait (UNDP, 2010).

Based on these challenges, KISR upper management and key external stakeholders targeted the water sector as one that requires a substantial level of research support. The WRC will therefore be supported in terms of expanding its research portfolio through the coming strategic plan and thereafter.

5.7.3 Programmes to Address the Challenges

As part of the development of key focus areas for the WRC, KISR organised several meetings with leading executives from the water sector of Kuwait to establish the foundation of a research road map for the sector that can guide KISR in developing its strategic R&D plan. The meetings were held with executives from the Ministry of Electricity and Water, Ministry of Public Works, Kuwait Oil Company, and from the private sector, Abraaj Water (drinking water production), and Kharafi National (infrastructure project development), as well as senior researchers from Kuwait University. During these meetings, discussions were focused on identifying the main challenges facing Kuwait in the aspect of water, the importance of these challenges, and the ability of research to address such challenges.

Based on these discussions, a total of seven challenges were identified. The five AR programmes, developed by teams from the WRC and their external advisors, addressed all of these challenges to some degree, with a particular focus on four of them. The programmes are expected to produce new technologies to be applied in desalination and wastewater treatment. They will also develop new approaches, policies, and knowledge-based tools to be applied to a range of water issues, such as groundwater development and protection and management of Kuwait water system.

It should be noted that there is a variety of expertise in KISR that can be applied to these challenges, and to others that are relevant to water but included in other programmes (such as environmental issues). Where this is the case, researchers will work across centres; this will be facilitated by the creation of discipline groupings

across KISR as follows: Innovative Desalination Technologies Research Programme, Thermal Desalination Technologies Research Programme, Innovative Technologies for Wastewater Treatment and Reclamation, Natural Water Resources Development and Protection Research Programme, and Water Resources Management and Allocation Research Programme.

5.7.4 Water Research Centre Organisational Structure

The organisation of the Centre will follow the structure agreed on as part of the KISR Transformation Project High Level Organisation and Governance recommendations. The WRC includes five PS and a manager for TDS activities, and they will report directly to the Director of Technology. The WRC will initially need two researchers to act as RCs. Figure 5-4 illustrates the Centre's organisational structure and governance.

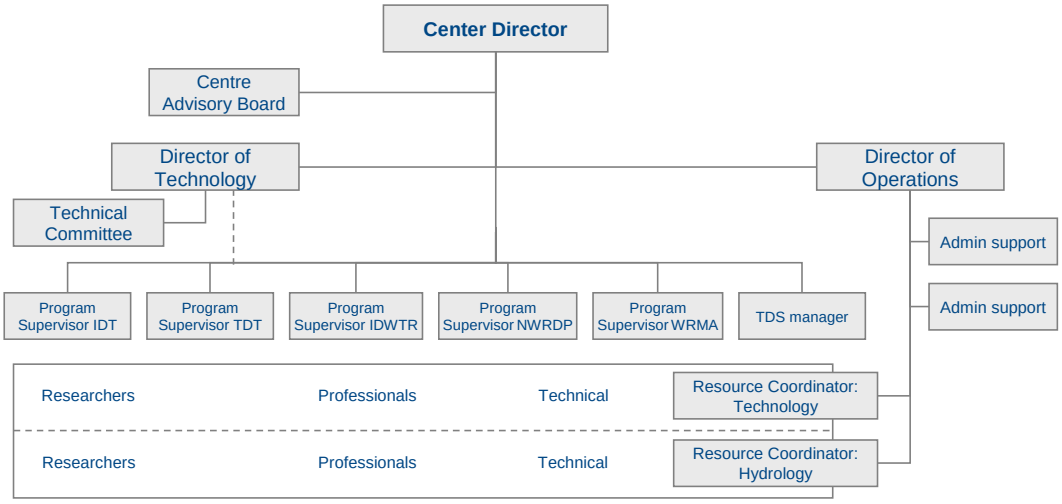

Figure 5-4: WRC organisational structure and governance (source: Little, 2009)

5.8 Description of the Environment and Life Sciences Research Centre (ELSRC)

The ELSRC brings together the capabilities of the former Food Resources and Marine Sciences Division and the environmental science components of the Environment and Urban Development Division in a single entity. The ELSRC was established to help solve critical national challenges facing the population and environment of Kuwait, in terms of understanding and managing the anthropogenic and natural pressures on the marine, terrestrial, air, and coastal elements of the environment, the impacts these have on terrestrial and aquatic farming systems, and how they influence the health and well-being of the Kuwaiti population.

5.8.1 Vision and Mission for the ELSRC

By 2030, the ELSRC aims to become the international focal point of scientific knowledge on agricultural and environmental issues in arid climates, and in understanding their implications in terms of the quality of life for the Kuwaiti population.

The ELSRC provides evidence and expertise to the industry and to policymakers to help them understand and manage all aspects of the biotic and abiotic environment. It hosts core competencies across all aspects of food production and nutrition, encompassing agriculture, aquaculture, food and nutritional science, as well as the interface of food production with the environment. It provides rapid response capabilities in the event of natural and anthropogenic environmental crises, and it leads Kuwait's compliance with international environmental treaties and mandates.

5.8.2 Kuwait's Challenges in the Environment and Life Sciences

Kuwait's terrestrial and marine ecosystems are some of the most sensitive and badly damaged in the world. Kuwait's terrestrial and aquatic environment were damaged by the 1991 Gulf War, and further damaged by poor environmental regulation and management. Notable problems include poor air quality, primarily due to dust storms arising from sand destabilisation; impact of oil production and sewage discharge; and largely unregulated coastal zone development.

Kuwait faces further challenges in food production and nutrition. Kuwait relies extensively on imported food from other countries, some of which have low quality

standards, and this has implications in terms of food security. Kuwait's domestic agricultural industry, broadly comprising covered and irrigated agriculture and dairy and poultry farming activities, is relatively inefficient. Key issues surround the excessive water use in productive agriculture and greenery maintenance (especially, given that, Kuwait relies on desalinated water for 95% of total use) and the availability and cost of animal foodstuffs (UNDP, 2010). Kuwait relies primarily on imported food from countries with poor food regulations, making food safety a significant issue. Finally, at the consumption level, poor diet and inactive lifestyles have resulted in a high prevalence of nutrition-related diseases, notably coronary heart disease and diabetes. Based on these challenges, the KISR upper management and key external stakeholders identified environmental, food, and marine issues as some of the most important to Kuwait's long-term prosperity. Given the interlinked nature of these disciplines, relevant components of the Food Resources and Marine Sciences and Environment and Urban Development Divisions have been combined into the ELSRC, which is tasked with improving the Kuwait environment, and as a result, the well-being of its population.

5.8.3 Programmes to Address the Challenges

Setting the direction for the ELSRC was achieved through a series of workshops involving senior researchers from KISR, policymakers from relevant government agencies, e.g., Environment Public Authority (EPA), Public Authority for Agriculture and Fisheries Resources (PAAFR), and Ministry of Health (MoH) to identify the

challenges of greatest importance to Kuwait, as well as the role of KISR in meeting them.

Based on these discussions, a total of 16 challenges were identified. The challenges were prioritised on the basis of the importance of the challenges to Kuwait and their fit with the current or potential capabilities of KISR and the ELSRC. The challenges of greatest importance were aggregated into ten 'grand challenges' that will drive a series of research projects, which together, will form the structure of the ten programmes encompassed within the ELSRC.

Each programme was designed to respond to these challenges through AR and policy support projects. In some instances, the programmes offer additional benefits through specific interventions for KISR's commercial clients, and these are referred to as Technology Development and Services TDS projects. These TDS projects, which contribute to the overall aims of the programmes, are included within this document; other ad hoc TDS activities are managed through a separate TDS function within the ELSRC.

The scope of the ELSRC encompasses those challenges that pertain to agricultural systems, as well as the application of biotechnology to solve problems within these systems. It does not include anthropogenic input to the environment or their control (e.g., emissions reduction from the petroleum sector; saline water output from desalination facilities), as these are covered in other KISR programmes.

In essence, the whole programme is targeted at either environment or food production issues, with three cross-cutting programmes in crisis decision support across all domains, as well as to the application of biotechnology in the agricultural and environmental sectors. These programmes include the following: Environmental Management, Coastal Management, Ecosystem-based Management of Marine Resources, Biodiversity of Terrestrial Ecosystems, Air Quality, Crisis Decision Support, Aquaculture, Arid Land Agriculture Production, Food and Nutrition, and Biotechnology.

5.8.4 ELSRC Organisational Structure

The organisation of the ELSC follows the structure agreed on as part of the KISR Transformation Project High Level Organisation and Governance Recommendations. The ELSRC includes ten PS and a supervisor for TDS activities, and they will report directly to the Director of Technology. Figure 5-5 shows the organisational structure and governance of the Centre.

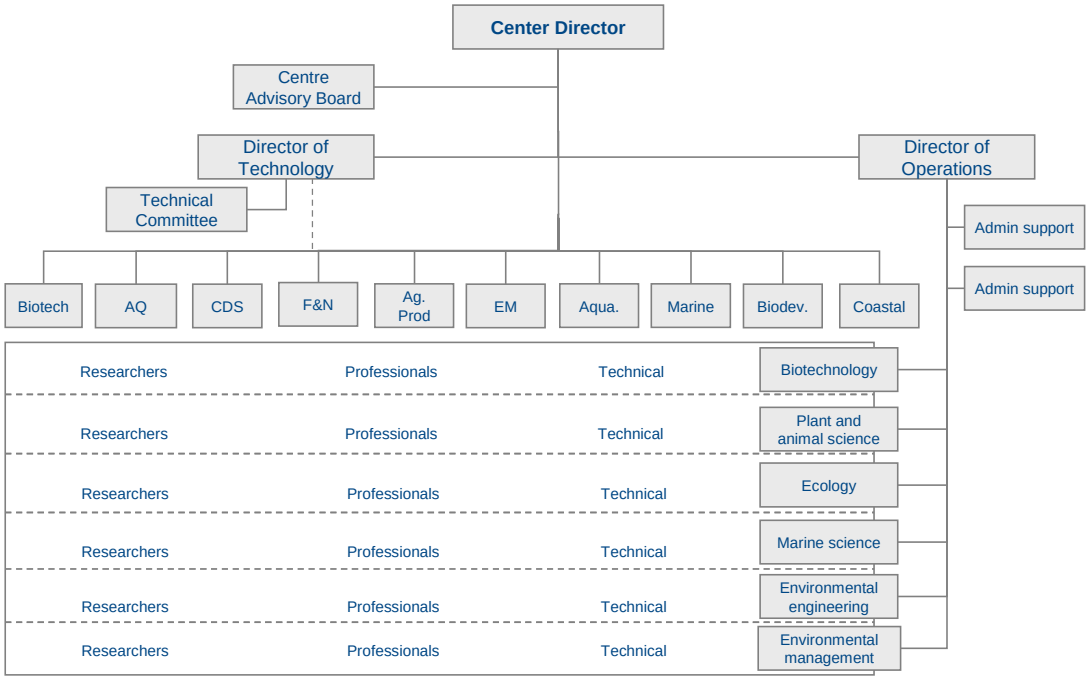

Figure 5-5: ELSRC organisational structure and governance (source: Little, 2009)

5.9 Summary of Key Challenges for the Core Research Centres at KISR

The four core centres at KISR seemingly share a common list of key challenges pertinent to strategic, organisational, technological, and cultural aspects, which each centre has to confront and resolve via having an effective and efficient IT alignment process. This is imperative in SR&D organisations, such as that of Kuwait with the vision of achieving excellence in science and technology, and more importantly towards a successful technology transfer process.

Key challenges consist of the following:

- Aligning R&D with the overall organisational and business strategy at KISR via its core research centres and divisions, their mission and scope of activities
- Developing new knowledge, products, and services for effective and efficient technology transfer activities
- Formulating strategic plans to better understand and implement the strategic alignment process, particularly relevant to the restructuring of the internal context against the external environment which KISR serves, as well
- Achieving international recognition as a Centre of Excellence for the development and application of innovative technologies for the productivity and performance of all the core research centres and divisions at KISR.

In order to meet and resolve these challenges, it is apparent that the organisational culture be modified and given attention to by the leadership, with strong coordination and support from the core centres and research divisions towards achieving strategic alignment. The Centres have to focus all their efforts on the aforementioned key challenges by developing solutions, strengthening their research base, fostering linkages not only in the country, but also with international science and technology institutions, even including the academe. It also calls for establishing a vigilant workforce for all industries relative to petroleum; energy and building; conservation of urban infrastructure, as well as preservation of the natural environment; sustainability of water resource and industry; managing anthropogenic reserves on the marine, terrestrial, air, and coastal elements of the environment; their impacts on the

terrestrial and aquatic farming systems, and how they affect the health and well-being of the Kuwaiti population.

Having said and hopefully done, strategic alignment could be the only answer to coping up with all these critical issues and national concerns with KISR taking the lead and governance in Kuwait and in the Gulf in support and in line with the national government's S&T thrusts.

5.10 IT at KISR

The National Scientific and Technical Information Centre (NSTIC) provides science information resources and advanced online tools and services to support the research and development activities at KISR and in Kuwait. Services offered range from literature searching to training and consulting in various librarianship and digital content management fields. Moreover, NSTIC meets information needs and requirements of government agencies, authorities, and various institutes. The goals behind establishing NSTIC are summarised in the following:

- Updating and developing basic groups of information resources in scientific and technological fields to assist information service
- Providing information service to beneficiaries inside and outside the Institute playing the role of a national library for deposition of government and annual reports in the fields of sciences and technology, building resource sets for Kuwait, organising them, and making them available for beneficiaries

- Providing and supporting facilities of computer technology and networks inside the Institute, developing automated scientific applications to support research projects
- Managing and developing scientific and administrative systems and databases for various departments of the Institute
- Executing integrated IS for decision support
- Encouraging cooperation and coordination with local, regional, and international institutes in the field of information and providing technical consultancy in the field of IT
- Developing national cadres specialized in the field of IT.

Figure 5-6 illustrates the organisational chart of NSTIC which includes four departments.

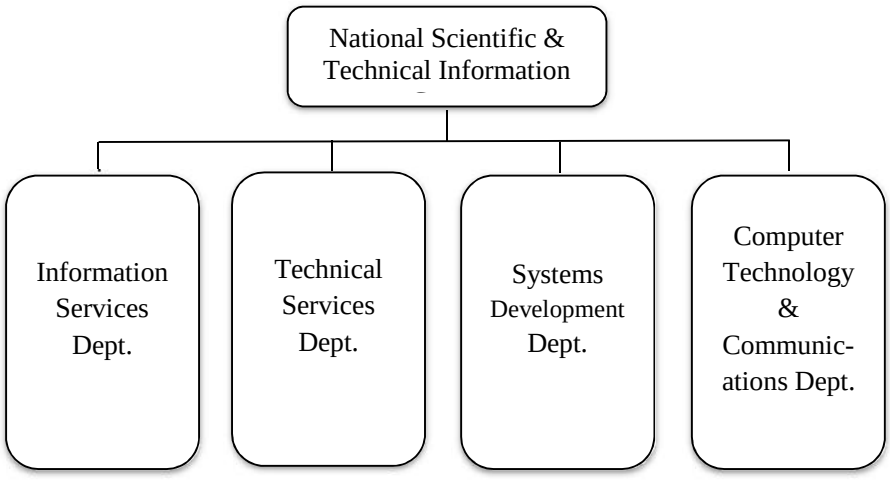

Figure 5-6: Organisational structure of NSTIC

5.10.1 Technical Services Department

The Technical Services department is specialized in the field of integrated library systems, developing information resources according to supply and subscription policy in the international databases, applying documents management system, providing technical consultancy for the construction of information centres, providing delivery services for documents of international sources, preparing books, budget and information resources. The Department's responsibilities are centred on the following:

- Collecting, developing, and organising group resources of the National Centre
- Selecting bibliographic achievement, ordering and receiving books, chronicles, technical reports, patents, specifications, maps, CDs, in addition to other resources of information via purchase, gifting, and exchange
- Indexing, classifying, and preparation of books, chronicles, specifications, CDs, and other printed and nonprint resources of information
- Updating and maintaining automated index VTLS-OPAC
- Planning, updating, executing, and maintaining automated system for libraries at the National Centre (VTLS)
- Coordinating and approving budget for books, chronicles, and other information resources at the National Centre
- Preparing training courses on national and regional levels in the field of technical services
- Providing technical consultation in the field of libraries and information

- Coordinating with local and regional information centres to cooperate in unifying information networks
- Developing information resources sets in the field of science and technology via the resources development programme, assisting needs of researchers and beneficiaries inside and outside the Institute
- Preparation and organisation of IS in order to ensure easy broadcasting and retrieval of information to and from researchers
- Inclusive development for sets in the following fields of science and technology, namely, Agriculture and Pasture Management, Engineering (Building, Power), Earth & Environmental Sciences, Marine Biology, Materials Sciences, Oil and Petrochemicals, Libraries and IT, Water and Hydraulics, Economics, and Management
- Delivering orders of beneficiaries in case of availability at the Centre, specialised libraries or information centres in the State of Kuwait
- In case of nonavailability of such documents locally, it shall be ordered from information centres outside of Kuwait, i.e., British Library, National Service Technical Information Institution, etc.

Furthermore, the department aims to promote the information resources of Kuwait in the aforesaid areas/disciplines issued by various ministries and agencies of the country.

Technical Services department has developed the 2015–2020 strategy, as explained in the succeeding sections.

5.10.2 Information Services Department

The Department specialises in providing and developing scientific and technological information for beneficiaries, represented in the service of lending, references, and documenting delivery service, references service, and assisting beneficiaries; also, developing information resources, training beneficiaries on using such resources and providing a scientific information service inside Kuwait. The Department has for its responsibilities the following:

- Specialised Information Services: Providing specialised information services in specific field for a group of researches of specific departments of the Institute via cooperation between information specialist and researchers and departments concerned with services, including current awareness, information research, training beneficiaries, and publication in the field of specialised information

- Current Awareness: Done via specialised information coordinator for each department
- Information Research: Providing bibliographic information and full texts related to all subjects which interest researchers, beneficiaries of information services at the Centre from inside and outside the Institute
- Training Beneficiaries: Preparing and organising training and guidance courses for beneficiaries inside and outside the Institute as per request and need of beneficiary.

5.10.3 Computer Technology and Communications

The Department specialises in the evaluation, operation, and support of linking networks, computer, and communication means. It also lends support to library atomisation applications, research atomisation, preparation of criteria and standards in the field of IT, securing the Institute's resources of computers and informatics from risks of sabotage, and providing consultation and technical support in the field of IT. It likewise sets technical specifications for devices, programmes, and distribution terms thereof, executes tenders for devices and programmes including evaluation, selection, device receiving, and distribution to various departments. The tasks and responsibilities of the Department are the following:

- Maintaining computer facilities, effectiveness, and performance
- Providing and updating programmes and services for beneficiaries inside and outside the Institute
- Providing computer maintenance services for various departments of the Institute, giving priority to the Finance Departments
- Defining and affording computer service costs and facilities according to the following:
    - Beneficiaries from inside the Institute according to related policies, bylaws, and regulations
    - Beneficiaries from outside the Institute, according to related policies, bylaws, regulations.

- Providing computer services and facilities in order to achieve the two goals as follows:
  - Rendering support to research tasks, supervising departments of the Institute
  - Providing services to beneficiaries according to latest developments in the field of computers and facilities.

5.10.4 Systems Development Department (SDD)

This Department specialises in analysis, design, and maintenance of scientific applications using computer programmes, scientific and administrative IS using updated tools, programmes, and databases to automate operation processes, units within the Institute, developing services, rendering support to decision making, managing, and developing scientific and administrative databases; likewise, maintaining information security and information resources. The tasks of the Department are concentrated on the following:

- Developing and supporting scientific, administrative systems, and databases management application
- Information Deposition, i.e., depositing the digital information for KISR's research and administrative departments towards helping develop and provide necessary support via the Scientific Development, Administrative Development, and Databases Management Teams

- Upgrading KISR Portal
- Introducing Oracle collaboration based on email solution
- Upgrading KISR website
- Developing new applications using web technologies
- Developing scientific applications and databases to support different R&D projects
- Performing statistical analysis, modeling, and simulation.
- Developing maps for Kuwait Voluntary Work Center.

Furthermore, the department developed several systems as shown in Table 5-1.

Table 5-1: KISR Systems

No	Systems Name	No	Systems Name	No	Systems Name
1	Personnel Information System (PEIS)	24	Company Timesheet (CTS)	46	Stores (STR)
2	Attendance & Security Control Application	25	Contract for Consultant, Services Supply & Maintenance (CCS)	47	Telecommunication Services (TSS)
3	Property Systems	26	Future Budget (FB)	48	Weekly Time (WTR)
4	Training Information System (TCIS)	27	Future Commitments (FC)	49	Year End Budget Preparation (YBPS)
5	Major Construction Projects System (MCP)	28	Future manpower Costing (FMPC)	50	Operational Contracts Employees (OCE)
6	KISR ICT Modernization Projects – Program Management (PM) Operation and Maintenance	29	Future Mission, Training & Consulting (FMTC)	51	Project Management Information System (PMIS)
7	KISR ICT Modernization Projects – HRMS Operation and Maintenance	30	Payroll and Personnel Information (PIPS)	52	Year End Accounts Reporting System (Year OFA)
8	Public Relation Online (PRO)	31	General Ledger Journal Voucher (GLJV)	53	New HR Website
10	Security Information System	32	Housing Contracts (HC)	54	World Poultry Science Association – Kuwait Branch – WPSA Website
11	Editing and Translation Section Application (ETS)	33	Internal Services (ISS)	55	HR-English Test Web Application
12	Document Management System (DMS)	34	KISR Financial History (KFH)	56	HR Services
13	KISR Portal	35	Registry Automation (RA)	57	KISR Fuel Cards System
14	KISR Website	36	Manpower Costing (MPC)	58	Meals Survey Website
15	Science and Technology Magazine Website	37	Messaging (MSG)	59	Proposal Review Evaluation System (PRES)
16	Creativity & Innovation Website	38	Mission, Training and Consulting (MTC)	60	Project Propos AL Information System (PPIS)
17	HR Website	39	Old Payroll (Report/Query) (Ops)	61	Research Stuff Productivity KPI's System
18	Old Lab Requests Information System (LRIS)	40	Operational Contract Timesheet (OCT)	62	Check Processing (CP)
19	Accounts Payable (AP)	41	Overtime System (OT)	63	Scholarship Information (SIS)
20	Account Receivable (AR)	42	General Ledger (GL)	64	Budget Automation (BA)
21	Bank File Generation (BFG)	43	Petty Cash (PCS)	65	Cash Management (CMS)
22	Bank Letter of Guarantee (BLGS)	44	Project Accounting (PA)	66	Budget & Commitments (B&C)
23	Bank Reconciliation (BR)	45	Purchasing (PUR)		

Additionally, SDD provides specific software and IT systems for clients inside KISR such as research centres and outside KISR. Examples of the designed systems as required from SDD clients are the following:

- SP002K Project: Kuwait Integrated Environmental Information Network (KIEIN)
- EC022C Project: Coastline Evolution of Kuwait Using Remote Sensing Technique
- EU038C Project: Evaluation of Construction Materials Used in the Manufacture of Concrete and Locally Available
- FB051C Project: Microbial and Chemical Contaminants Associated with Seafood and its Safe Consumption in the State of Kuwait
- FB059C Project: “National Nutrition Survey for the State of Kuwait (NNSSK)
- FB036C Project: Assessment of Acrylamide in Heat Process Foodstuff Consumed in Kuwait
- WT013C Project: Development of a Wastewater Quality Database and Assessment of Effluent for Potential Reuse in Kuwait
- Shrimp Database Project
- EC058C Project: “Kuwait Air Quality Index SystemEC032C Project: “Long-Term Prediction of Winds for the State of Kuwait.

5.11 IT Strategy 2015–2020

The IT facilitated the processing of all IT research activities implementation undertaken for the enhancement of KISR processes, including the following:

- Ensured access to provision of necessary reports to KISR's Units and Project Leaders
- Directed automation of the majority of finance processes
- Directed installation of the new communications systems (telephones) to all KISR employees and Wi-Fi access in the Shuwaikh Campus.

5.11.1 Key Challenges

The Strategic Plan has been reported to have been shaped by the challenges facing KISR. The main challenges expected to impact the institute include the following:

- Government regulatory agencies (State Audit Bureau, Ministry of Finance, Central Tenders Committee, etc.) can cause significant delays in KISR operations which in turn will impact the Centres and other Sectors.
- Securing Board of Trustees' approvals for revised policies and performance expectations
- Loss of experienced staff
- Lack of full integration between processes due to the structural transformation changes

- Practices emerging from Research Centres sometimes delay the work process within the Sector.
- Lack/absence of up-to-date computers which cause serious delays
- KISR Transformation requires new policies, procedures, and job descriptions.
- Lack of automation
- Lack of cooperation from governmental agencies to streamline KISR work such as approvals, service support, etc.
- Complicated housing policies and regulations
- Non-interconnection of KISR utilities infrastructure with government services
- Completion of outsourced applications and services which is controlled by other parties (Internal and External).

5.11.2 Strategic Objectives

The main strategic objectives targeted by KISR include the following:

- Providing vital support to KISR's Research Centres and Sectors, as well as to the staff and important external stakeholders, including the Kuwait government, clients, and partners
- Supporting KISR's core business and operate efficiently within government regulations
- Improving continuously all sector processes to achieve operational excellence and deliver high quality services, improve internal procedural processes

- Improving execution processes
- Improving internal and external communication to build trust
- Developing and promoting mechanisms for communication and information-sharing
- Assuring that all departments achieve high customer satisfaction
- Recommending policy changes or development upon need
- Developing and upgrading financial and administrative applications
- Enhancing staff capabilities and capacities.

5.11.3 Information Communication and Technology Department

- IT Equipment Recovery Policy
- Templates, Checklist, Policies and Procedures documentation for preparing new installation for PC's, switches, etc., and also supporting existing IT equipment.

5.11.4 Strengthening KISR's Information and Communications Technology Infrastructure

A reliable, high capacity information and communications system is the backbone of every effective organisation within a modern economy. Best business practices depend on an organisation's ability to process information rapidly and reliably, to facilitate the exchange of information and ideas both within and outside the organisation, as well as to extract meaningful information from raw data in increasingly complex ways. KISR faces the continuing need to upgrade its

Information and Communications Technology (ICT) infrastructure and functionality. During the period of this strategic plan, the priority initiatives in this area of concern include the following:

- Enhancement of KISR's ICT security system policies and creation of an IT disaster recovery site and business continuity plan and capacity
- Development of new IT systems in the areas as follows:
  - Training Management System
  - Correspondence Management System
  - Contract Administration and Management System

In addition to these core initiatives, the ICT Department will also be providing support to several initiatives led by other organisations within KISR. Among the most important are support to the Centres and other sectors in implementing a Customer Relationship Management (CRM) system to support Key Account Management and business development activities; support to the Planning Office (PO) and KISR's Leadership Team in the automation of strategic and operational planning and in the development of a Performance Management Dashboard and the data systems that will drive it; support to KISR in establishing the GLORIAD-Gulf broad band internet connection and implementation of the Laboratory Information Management System with the Research Centres.

5.11.5 Significant Continuous Improvement Projects

The KISR IT strategy has adopted a continuous improvement philosophy. This means that during the period of this strategic plan, KISR will undertake various activities to assure that all of its processes are providing the quality outputs in an efficient and timely manner to meet the needs of internal customers and external stakeholders, and particularly, the governmental oversight bodies. One of the driving factors in KISR's continuous improvement effort constitutes the annual results of KISR's internal customer satisfaction survey. The results of this survey play a big role in determining where the Institute needs to focus its continuous improvement efforts. Among the activities anticipated for this Strategic Plan period are the following:

- Continuing the process of training and placing human resources and business representatives within the Research Centres to provide better and more timely customer support
- Creation of help desks and customer response policies and standards within the customer facing departments within KISR to further enhance customer service culture and performance
- Improvement in printing and production services
- Updating policies and regulations throughout KISR
- Development and implementation of key performance indicators for quality, efficiency, and cycle time for all KISR functions and services

- Developing/Updating Disaster Preparedness/Recovery Plan for KISR personnel and facilities (working with relevant KISR units and government agencies)
- Implementing the Geographic Information System for KISR facilities database
- Connecting KISR utilities infrastructure with government service networks.

Table 5-2 presents information on how to strengthen KISR's Information and Communications Technology Infrastructure.

Table 5-2: Strengthening KISR's Information & Communications Technology Infrastructure

Initiative	Description
ICT Security Policy	Develop ISO 27001/27002 for ICT information security framework
Disaster Recovery Centre for business continuity	Build a disaster recovery centre and develop a comprehensive plan for operating under these circumstances
Development of Training Management System	Develop a Training Management System to support operation of MDD
Automation of operational plan and Performance Management	Develop a system to manage the preparation and implementation of the operational plan, and monitor the performance of different organisation units based on progress and key performance indicators (KPI)
Development of Content Management System	Develop content management system to archive and manage KISR content of documents and provide procedures to manage workflow in a collaborative environment
Green Data Centre	Redesign cooling and power systems in the data centre for maximum energy efficiency and minimum environmental impact and consolidating all servers by developing virtualisation
Establish Gloriad-Gulf Broad Band Connection	Connect KISR and Kuwait scientific organisation through Gloriad Network

Initiative	Description
Develop Contract Administration and Follow-up System	To develop a system to manage and track all KISR contracts.

Furthermore, the current strategy detailed some projects regarding scientific information dissemination, such as the following:

- Kuwait National Consortium of Scientific Electronic Resources (KNCSER):

This project will support research and scholarly activities through the availability of information resources including scientific publications, standards, manuals, special studies, and reports. The project will promote research resources for scientists, professionals, and students. The responsibility of the project lies with NSTIC division and will depend on the KISR/NSTIC relationship with stakeholders and publishers. Reports on the work plan, policies, procedures, and marketing programmes will be submitted to the KISR Leadership Team. The project objectives are as follows:

  - To provide information related to all scientific fields to the local organisations and universities
  - To enable stakeholders to reach scientific quality content that would help in research and decision making
  - To develop policies and procedures to meet the growing information needs of different organisations.

The outputs of this project will include the following:

- A digital portal accessed by local organisations and universities
- Well-structured programme to train users on various databases and tools
- A monitoring system to manage and analyse the use and the impact of the project

- Kuwait Digital Repository (KDR).

This project is proposed to facilitate and promote the visibility and accessibility of Kuwait's scientific intellectual assets. The project's responsibility will be within the NSTIC division. The development and success of this project will depend on the support of KISR Research Centres to provide data for the repository system. The project's objectives are as follows:

- To manage, preserve, and retrieve KISR and government scientific publications and research data;
- To promote accessibility of local information both at the national and international levels; and
- To establish a national digital preservation strategy and organise lectures and workshops on institutional repositories and digital preservation.

The outputs of the project will include the following:

- A digital laboratory to support the digitisation process
- A digital preservation strategy
- A web interface

- A series of lectures and workshops to promote awareness of sharing and preserving research results

- Gulf Electronic Scientific Database (GESD).

The project is proposed to provide a tool to access information related to the Gulf research publications, papers, patents, and researchers' CVs. Moreover, the project is aimed at to create a platform that allows information accessibility to project partners. The project will be the responsibility of the NSTIC Division. Kuwait University (KU), Public Authority for Applied Education and Training (PAAET), local private universities, and the Gulf public and private universities and institutes will participate as active members in the implementation at the different levels. The approval of this project will be sought from the KISR Leadership Team and at a later stage from the GCC General Secretariat. The project objectives are as follows:

- To establish a knowledge-based system for R&D in GCC countries
- To provide decision and policy makers with information on research and innovation to support policies and planning
- To support researchers with a reliable information system on R&D and innovation activities
- To support collaboration with international organisations in research
- To enhance and strengthen the position and presence of GCC countries internationally.

The outputs of the project will include the following:

- A knowledge-based system for R&D in the region to support decision makers to assess research performance through studies and statistics
- A cyber-infrastructure interoperable platform for researchers to share knowledge and collaborate regionally and globally
- Indicators in science, technology, and innovation and socioeconomic indicators coupled with geographic information system technologies
- Technological capabilities to include modeling, simulation, and visualisation environment.

- Science and Technology Publication Program (STPP).

Currently, KISR has been producing around 100 international publications per year. The proposed programme will support researchers with tools and training to enhance KISR's scientific productivity. All KISR's scientific publications follow an established procedure for submission. NSTIC will develop procedures to allow KISR researchers to follow-up on their article submission in journals and deposition in the NSTIC database. Establishing a unit to support scholarly communications services will help enforce KISR procedures and allow for monitoring the publications process. NSTIC division's responsibility is to set up the procedures and to obtain the approval of KISR Leadership Team to implement the service. The programme's objectives are as follows:

- To develop policy and procedures in relation to the submission and publishing of KISR scientific papers in international journals

- To organise workshops and lectures to support scientific publications and to promote awareness on the author's rights, patents, and publishing
- To provide automated tools to support researchers in developing their manuscripts
- To develop procedures to deposit KISR's publications in NSTIC repository system
- To establish a centre at NSTIC for International Standard Serial Number (ISSN) for journals published in Kuwait.

The outputs of the program will be the following:

- A unit to be established at the NSTIC to provide services and guidance to KISR researchers on publishing and copyrights
- A series of workshops and lectures will be conducted to promote publication model rules and author's copyrights
- An ISSN Centre for Kuwait.

- Integrated Solution for Inquiry-Based Science Education and GLORIAD Connectivity.

The project will highlight KISR's role and its contribution to promote and enhance science education in the country. Through the involvement of NSTIC, KISR's national role as a catalyst will be emphasised to prepare the new generation to become future scientists. KISR/NSTIC and other parties including the Ministry of Education (MOE), National Centre for Education Development (NCED), and the Regional Centre for the Development of Educational Software (RedSOFT) will coordinate and formulate a

team to implement the project. NSTIC has contacted the NCED and the Kuwait Foundation for Advancement of Sciences (KFAS) to present the project for funding. The GLORIAD connectivity will be the responsibility of KISR's ICT Department in collaboration with the Ministry of Communication. The project's objectives are as follows:

- To support and facilitate the implementation of integrated learning system in science and math education
- To introduce an educational programme that promotes the knowledge and capabilities of teachers and students in the science and math fields
- To acquire a broad band connectivity to the Global Ring Network for Advanced Application Development (GLORIAD).

The outputs of the project will be as follows:

- An educational programme to support the current local science and math curriculum
- A series of workshops for teachers to enhance their skills and knowledge in science and math fields
- A monitoring system to evaluate and assess the impact of the project on educational output.

5.12 Chapter Summery

The Kuwait Institute for Scientific Research (KISR) is being used as a case study for this research. The core activity of KISR is focused on the provision of Scientific Research and Development (SR&D) to the Kuwait government, institutions, industry and society. Therefore, a background discussion of SR&D is presented at the beginning of this chapter. KISR was originally established to serve both public and private sectors in the State of Kuwait with a long history of strategic planning based on scientific consultations. Due to the rapid growth of the KISR, 10 strategic plans are discussed with summary details provided. Furthermore, the four principal centres of research within KISR are described to identify the Key challenges they have faced historically, now and for the future. The IT infrastructure at KISR is presented as well as the IT strategy based on its intended alignment within the business and organizational strategy.

Chapter 6: Case Study Finding

6.1 Introduction

This research employed a single exploratory case study method and is qualitative in nature. Interviews with respondents and personal observations by the researcher himself were used to supplement the information gathered from KISR documents. This can also be taken as a phenomenological/interpretive study of the natural world of an SR&D setting, a nonprofit scientific institute with the end-in-view of delivering knowledge transfer services founded on results of research studies on different scientific area disciplines. According to Walsham (1995), interpretive studies are usually aimed at knowing the phenomena by way of meanings that people ascribe to them. In IS, interpretive approaches of research are intended to develop an understanding of the IS setting and the procedure through which the IS impacts and is influenced by the context. Meanwhile, the method used is in adherence to the case study methodology as described by Collis and Hussey (2009), an approach employed to investigate a single phenomenon (the case) in a natural setting and to employ a number of techniques to attain detailed information. Moreover, the same authors deduced that exploratory research is carried out for a research problem when there are not many, or no prior studies that could be referred to for information regarding the matter.

6.2 A Brief Description of the Interview Respondents from KISR

Initially, this PhD researcher chose 64 respondent interviewees to generate more responses from not only the senior managers but also from the heads of departments and units at KISR. However, this number had to be trimmed down because of reasons as follows: the selected interviewees said they do not have any knowledge of IS; they refused to have their responses recorded; they did not agree with interview timings, as well as the number of times they will be interviewed; they had too many tasks to hand; they did not feel secure as regards disclosing information; and they think that their work has nothing to do with strategic planning and IS. It was expected that those who were adamant about disclosing information and who refused to have their responses recorded would come from the IT group. Those who said they have so many tasks to do were from the research group. Surprisingly, those who made mention of no knowledge of IS were senior researchers. This, however, is indicative that they have always been more focused on doing research, rather than being involved with the latest trends in IT and IS.

It is worth mentioning that this research was aimed at 'we want to know' phenomena by way of the meanings people ascribe to them (Walsham, 1995).

Eventually, the list of interviewees came down to 37 who were more than willing and vigilant to share their knowledge, experiences, skills, and competencies in strategic planning and IS.

There were 37 sample interviewees chosen from the four centres of research and Technology Development and Services TDS. The 37 samples were composed of 9 senior managers from the different centres, 7 IS/IT senior managers, 13 researchers/scientists, and 8 consultants. Table 6-1 presents the profile of the sample interviewees.

Briefly, the senior management represents the CEO component. These are the people who do management roles such as giving instructions, authorising research project funds, executing strategies, and deciding on the approach and policies in the research centres and departments.

The research group comprises the senior scientists/researchers who prepare and implement proposals, lead the research team, and carry out scientific applied research.

The IS/IT senior managers make up the CIO component who serve as the support group to matters relating to knowledge solutions and advanced ITs. This group is composed of the heads of technical services, computer technology, systems development, information services, and communications departments.

The last component is the planning and support team, the consultants who provide the consulting expertise, which is a specialised management role.

The sample interviewees were chosen on the basis of their roles in the organisational structure, their knowledge, skills, experience, and competencies in the areas of planning, strategy, and IS/IT alignment.

The interviewees were asked questions delving on organisational, strategic, and IS domains. On the strategic aspect, interviewees were asked whether the strategy applied in the centres is to a certain extent, understood, and whether each is aware and is a participant to strategic planning and developing, as well as in presenting recommendations to fill in whatever gaps may be revealed in the process of analysis.

With regard to the organisational domain, questions harboured on whether there is any satisfaction in terms of services rendered, problems, obstacles faced in the implementation of the plan, and critical activities that may have arisen in the process of implementation; and in the aspect of IS, the nature of relationships between the CEOs and the CIOs and the role of IT in the implementation of the objectives of the organisation.

All 37 interviewees were asked questions dealing with the strategic aspects; only the 7 IS/IT senior managers were asked questions concerning the IS components; while 8 consultants were asked to respond to questions that focused on the organisational domain. This researcher believed that all interviewees, irrespective of their job descriptions, should have acquired the capability to determine whether the organisation they have been a part of, based on many years of work, (they, being classified as senior scientists and senior managers) have been successful in the alignment of IS, and all aspects within the business and structure in the organisation, which is KISR. Table 6-1 presents the profile of the interviewee respondents

Table 6-1: Profile of the Interviewees

Ref No.	Gender	Years of Work	Job	Work Place	Interview Date
P1R1	M	15	R	ELSC	September 2012
P2R2	M	16	R	PRSC	September 2012
P3S1	M	22	SM	EBC	September 2012
P4S2	M	5	SM	EBC	September2012
P5R3	M	15	R	WRC	September 2012
P6C1	M	10	C	DGC	September 2012
P7S3	M	25	SM	WRC	September 2012
P8I1	F	4	ITSM	NSTIC	September 2012
P9R4	M	17	R	WRC	October 2012
P10I2	F	16	ITSM	NSTIC	October 2012
P11S4	M	19	SM	ELSC	October 2012
P12S5	M	23	SM	NSTIC	October 2012
P13S6	M	8	SM	WRC	October 2012
P14S7	M	18	SM	AFSS	October 2012
P15R5	M	11	R	AFSS	October 2012
P16R6	M	13	R	ELSC	October 2012
P17I3	M	8	ITSM	AFSS	October 2012
P18R7	M	15	R	ELSC	October 2012
P19R8	M	23	R	ERC	October 2012
P20C2	M	21	C	AFSS	October 2012
P21C3	F	20	C	PRSC	October 2012
P22S8	M	29	SM	ERC	October2012
P23C4	M	16	C	AFSS	November 2012
P24C5	F	23	C	PRSC	November 2012
P25R9	M	14	R	ERC	November 2012
P26C6	M	7	C	DGC	November 2012
P27C7	M	8	C	STS	November 2012
P28S9	M	25	SM	WRC	November 2012
P29R10	M	10	R	PRSC	November 2012
P30R11	M	13	R	ELSC	November 2012
P31C8	M	21	C	DGC	November 2012
P32R12	M	20	R	WRC	November 2012
P33I4	M	16	ITSM	NSTIC	November 2012
P34I5	M	24	ITSM	NSTIC	November 2012
P35R13	M	29	R	AFSS	November 2012
P36I6	M	21	ITSM	PRSC	November 2012
P37I7	F	20	ITSM	NSTIC	November 2012
Director General's Council (DGC) Administration, Finance & Support Services Sector (AFSS)					

6.3 Interview Findings

The findings generated from the interviews followed the structure of the research investigative framework and were presented in three domains as follows: context, content, and process. Each is discussed successively in this chapter. NVIVO software has been used as a tool to support, organise and provide a structure for the data analysis. The following steps describe the substantive use of NVIVO to determine and present the key findings:

- Preparing the qualitative data for analysis considering the ethical data protection issues. All data has been catalogued and indexed as shown in Figure 6-1

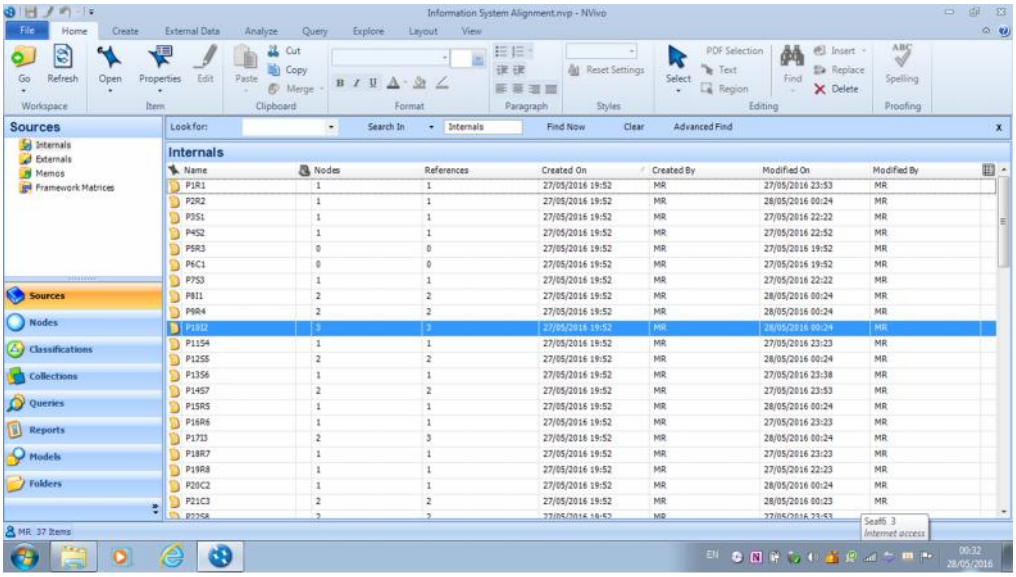

Figure 6-1: Transformed Version of Audio-Recorded Interviews into Text Formats by Using Transcription Technique in NVIVO Software

- Transcribing audio recording of interviews as shown in Figures 6-2 and Figure 6-3

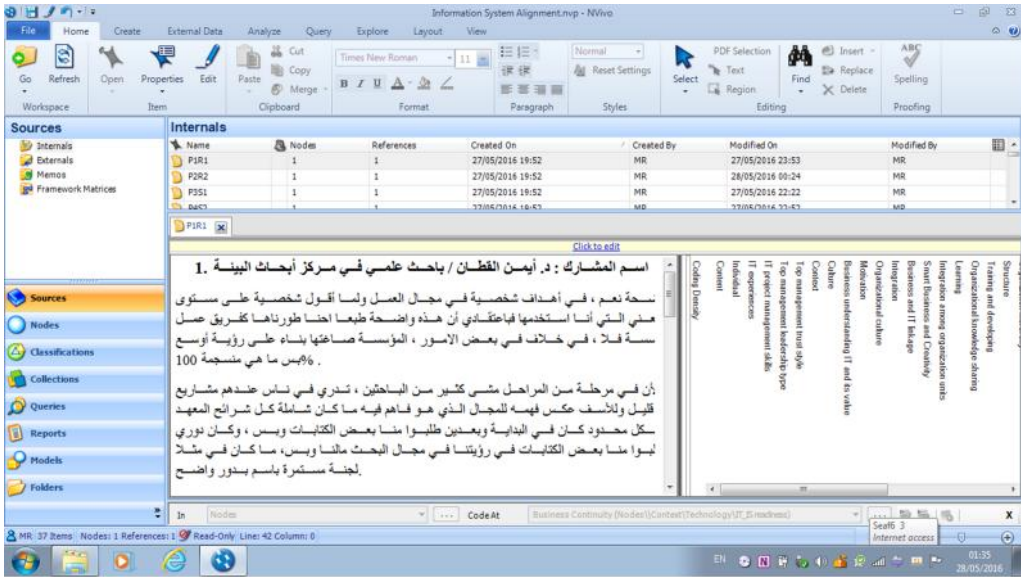

Figure 6-2: A Sample of Interview Transcript in Arabic Language by Using NVIVO Software

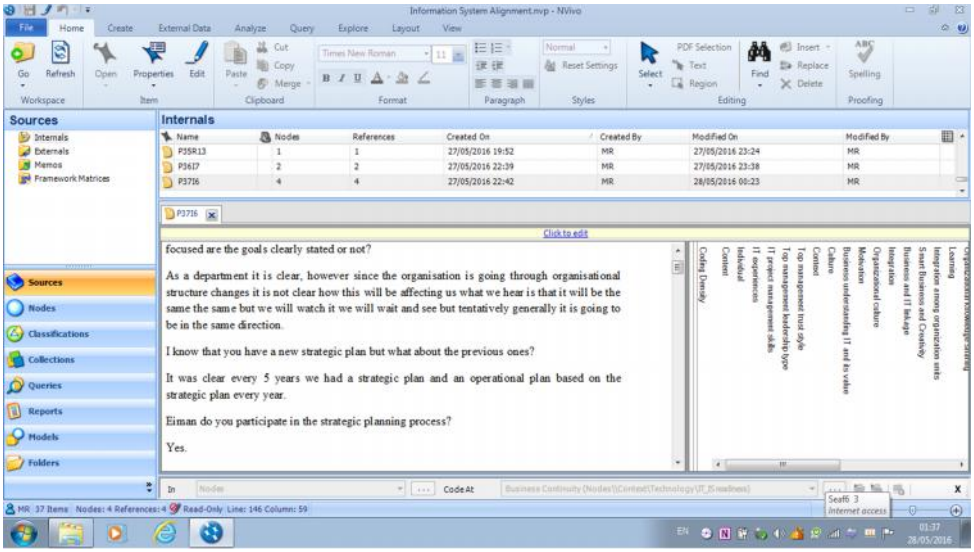

Figure 6-3: A Sample of Interview Transcript in English Language

- Conduct of the procedures for template analysis technique is shown in the followings:

1. creating of code -shown in Figure 6-4

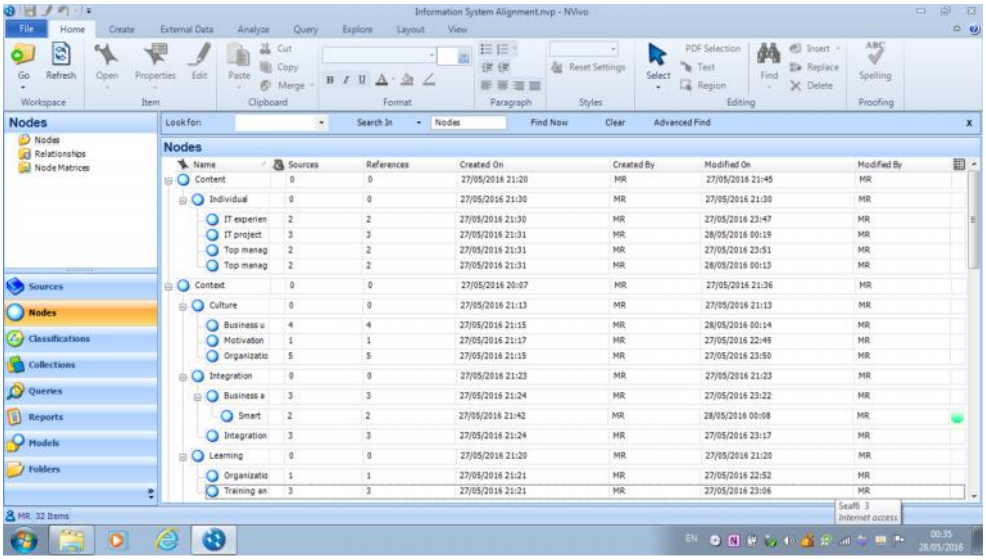

Figure 6-4: Overview of Nodes that were Created by Using NVIVO

2. coding of text -shown in Figure 6-5 and Figure 6-6

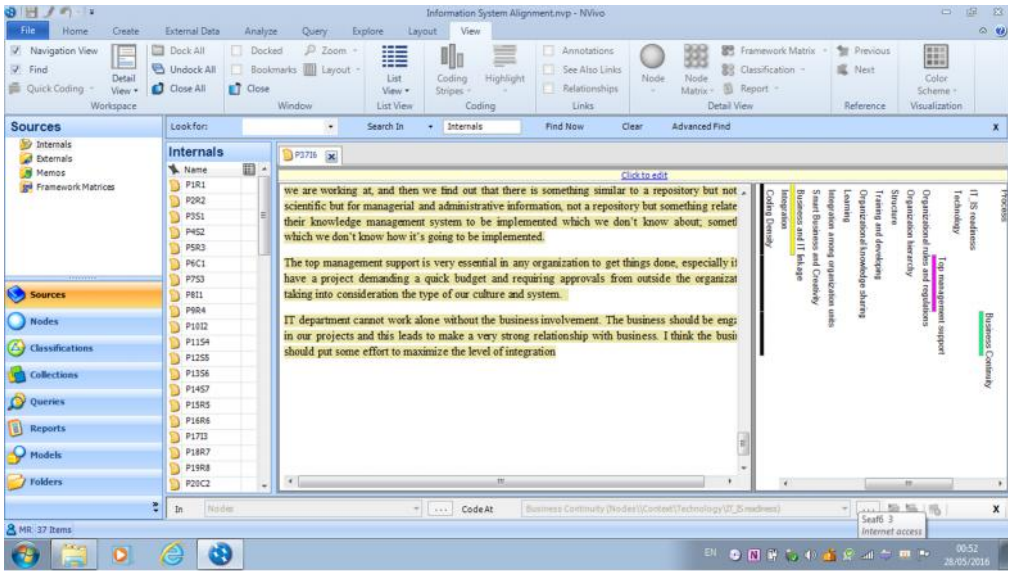

Figure 6-5: Coding Technique by Using NVIVO Software

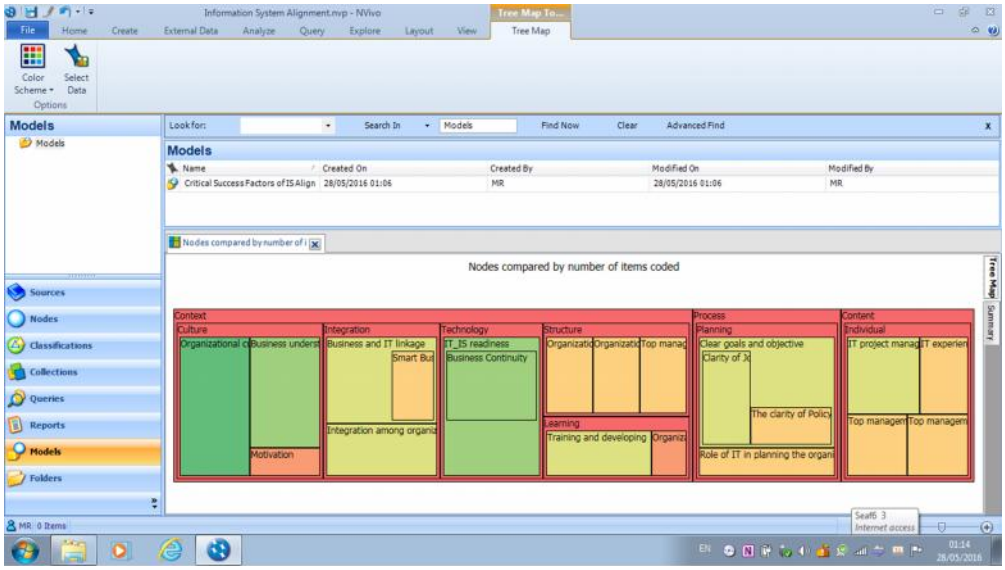

Figure 6-6: A Tree Map that Summarised Nodes Compared by Number of Items Coded

6.4 Context Domain

The findings within the context domain were categorized into five themes, namely, culture, learning, integration, structure, and technology. Each one has several codes.

6.4.1 Business Understanding IT and its Value

Interviews revealed that senior managers and researchers/scientists had a better understanding of aligning their projects with the vision and thrusts of the organisation, more likely, because they are very much involved, and are in the core of research and development, as well as technology transfer. One of the senior managers stated:

> *"Whatever technology we put into our research is dependent on the expectations and needs of the users, the beneficiaries, and the client". (P3S1)*

Another senior manager saw the importance of IT:

> *"It is recommended that IT becomes the basis for the upcoming strategic formulation, indicative that technology matches needs and expectations". (P7S3)*

Although, it is more costly, they inferred that the system needs updating and upgrading. For example, one good addition to the alignment is the telephone line system, which is now linked to the internet, and all lines are networked for easy access and availability of logs as to missed, received, and placed calls, and initially, caller

ids, as well, which to them is a smart start-off point. In parallel, from each research centre's end, as technology progresses, every research project is geared to fill in the gap in terms of search and management process. Apparently, they have indicated the inevitability of changing the old systems software to the latest systems technology, the Oracle as a senior manager at Environmental Research Centre (ERC) said:

> *"We have to go further in terms of implementing new systems within our organisation such as having new Enterprise Resource Planning (ERP) system like Oracle". (P19R8)*

Another added value is having a so-called Editing and Translation System (ETS) which is a database of reports edited, under columns that indicate the status of the documents, such as when the document is stamped for editing, the editors who edited the document, the dates when the document is stamped and received by the Project Management Office, when assigned to the editor, and the date, editing is completed. There still are loopholes in the system, such as, what is readily noted is the number of days the document has been retained before it is assigned to an editor, instead of the number of days it took the assigned editor to edit the document. At first glance, this would have the impression of delay and lags which could prove detrimental to the editing management. If the objective is to impress quality and quantity in the performance of editors, what should have been highlighted is the duration of the editing process from the editor's side. From a practical standpoint, this is strategic alignment with not only the structure but also in gauging staff performance in terms of speedy accomplishment of office functions. While these drawbacks need to be

resolved, the system has at least been helpful in tracing documents in cases they either get lost or misplaced.

Apparently, the selected respondents believed that the research management is getting closer to being decision makers themselves; databases, instructions, and software should be made available; business has become closer to IT; it has become centralised.

In contrast, on IT alignment, one of the respondents from the research side stated:

> *"Priorities have not been centred on advanced IT tools. Until now, the Excel database system has not been upgraded, and to aggravate the outdated tool, most of the staff are not even familiar with this tool". (P21C3)*

6.4.2 Organisational Culture

The findings generated from the interviews revealed that they are convinced that the individual behaviours in an organisation are carried across and extended to constitute the organisational behaviour, which is likely thought to produce the organisational culture. As one of the senior managers stated:

> *"It's very obvious that the employees have an influence on the organisational culture, as they are the base that construct the whole organisation". (P22S8)*

Also, responses showed that the consultants who participated in planning both business and IS are not familiar with the national and organisational culture of KISR. As mentioned by one of the interviewees:

> *"This is also not to discount the fact that they are foreign consultants and therefore, may not be altogether familiar with the culture of the Middle East or developing countries". (P30R11).*

In effect, this, to the researcher's analysis, has created disorientation in terms of structure in the organisation, as some consultants may not be in the know of the culture of the Middle East and the Institute, as well. Because they are given a free hand and control, this manner of implementing changes has caused confusion in delineating roles and responsibilities, as well as in coordination between and among the different centres and departments. Likewise, as has been the observation of most employees in the Institute, some have been displaced of their responsibilities and functions. The so-called Transformation or Re-engineering in the organisational structure has brought about displacement in the location of departments and units in the organisational structure, for instance, the separation of units like the Editing, Translation, Printing, Production, and Publication. The Editing Unit has been relocated in terms of structuring to the Project Management Office (PMO); whereas the Translation Unit which used to be combined with the Editing, being formerly called Editing and Translation Unit (ETU) is now each a separate entity with the Translation Unit, transferred structurally to the Marketing and Commercialisation Centre. Alongside, the Printing and Production also have been incorporated in the Technical and General Services Department. This, to some observers and to the researcher's perspective, is totally ignoring the principle that editing, translation, printing, and publication as per structure, functions, roles, and responsibilities should be working closely in smooth

coordination with each other, separately and collectively to improve and enhance the quality production of scientific manuscripts for readability, dissemination, and technology transfer activities. Evidently, what transpires after the research process towards publishing the research results on to transfer of technology is what makes the image of KISR tangibly credible and reputable, not only to the end users in the local, but also in the regional, national, and the international scientific world.

In addition, the interview outcomes revealed both negative and ambivalent responses as to whether the IT is supportive of the critical business activities in the value chain. Some were hesitant to make their pronouncements, probably because of some political underpinnings.

The politics issue in the organisation, as stated, has become so apparent, particular in the designees and appointees in high-ranking posts, who can more likely be said to fall short of qualifications to head the designated posts. Again, this is a sheer display of undermining people's qualifications on certain posts over designating people who are not qualified to handle management roles; evidently, a political issue.

One example given during the interview was regarding the lack of transparency and coordination as indicated in this interviewee's comment:

> *"The coordination, being amiss between finance and personnel services, and that could be a transparency issue as well as the lack of coordination and cooperation between these two significant divisions in the Institute". (P31C8)*

Accordingly, to one of the participants:

> *"The organisation in Kuwait has high uncertainty avoidance and power distance, with a moderate score on masculinity, and less on individualism". (P27C7)*

However, from the responses, the issue was more political and cultural rather than a work-related issue. To this interviewee's thinking, one purpose of implementing a successful organisational strategy alignment with IS/IT is somehow to render all staff satisfied with IT services, and to a certain extent, abate political conflict in the organisation.

Moreover, regarding the impact of the external environment culture on the organisation, for example, one interviewee said:

> *"I think the culture of the external environment has a lot to do with cultural aspects in the organisation. No clear vision; it's the system that lets you down. I heard that the breakdown was in the 1990s when the organisation lost 75% of the professional manpower in all departments in 1990 and 1991. That could be, but when I say culture, I mean culture throughout the country; the breaking point was in 1990 for the country; we still haven't recovered". (P37I7)*

6.4.3 Lack of Motivation

The following could cause a great impact on the IS alignment, lack of coordination, not to mention, displaced people, functions, and responsibilities, and eventually,

people losing their self-motivation, self-esteem, and work ethics, because there is a great degree of dissatisfaction, and to others, conflicts of interests.

The findings showed that the work environment had an effect on the performance and achievement of the organisation. An interviewee suggested a proposition which is based on the concept that conflict should be controlled and restricted; else the organisation would surrender to political pressures. One of the views went beyond that, when asked what the biggest challenge KISR is facing at present and the resounding answer was projected:

> *"How to cope up with the rest of the world—this is KISR's greatest challenge". (P4S2)*

6.4.4 Organisational Knowledge Sharing

It is likewise important to note according to the interviewees that strategic planning has to be done initially with program managers within the centre so that whatever they have prepared will eventually be presented in the overall actual formulation of strategic plans projected on a five-year term. As stated by one of the interviewees:

> *"I believe that knowledge sharing across organisation among the departments is critical to the success of our strategy. The current situation calls for preparing our future objectives in every centre of research and should be done through teamwork and brainstorming technique". (P29R10)*

They emphasised that they derived their foreseeable thrusts on the strengths, weaknesses, opportunities, and threats/risks (SWOT) analysis of each scientific

centre, in addition to evaluating the previous strategic plan such as, which were achieved, which needed solutions, and what recommendations would be most appropriate.

All departments within a centre are obliged to present all the needs and demands of their respective clients and users to become the basis for the upcoming strategic formulation, indicative that technology matches needs and expectations.

A senior manager agreed that everyone in the organisation should participate in the process of formulation of the strategic plan. Consequently, the formulation of the strategic plan should be represented by an experienced and senior staff within a particular division/department/unit, as the case may be, so that there will be coordination and a smooth formulation of objectives towards a transfer of information to respective parts in the organisational structure. What has been happening is that there are certain guidelines, policies, and procedures formulated and approved without prior consultation with the unit concerned, and then disseminated to that particular concerned unit, subsequently, only to create confusion and obligatory implementation of wrongly formulated guidelines, policies, and procedures, because the experts in the disciplines have not been given their role in the process of preparation. Hence, this misrepresentation of people's' roles in the planning and preparation have led to mediocrity and wrongful implementation and application.

6.4.5 Training and Development

The offering of training courses may be said to be, at the very least, acceptable, although, some courses have not been fitting to some personnel. However, findings showed that most people were involved in the strategy planning from day one; that made them learn the trends in management, the organisational culture, and this holds true for the top management and IT people. It is part of the ongoing training policy in the organisation, also defined as "on-job-training".

In all fairness to the Human Resource Division of the organisation in general, advanced computer systems has been one among the priority courses offered to the staff. All training courses are supposed to be coordinated within and among the different units/departments/centres, in order that demands and needs of all are met, and therefore offered to the staff who may either signify intent to enrol in the course, or to attend it, because it is required by a department or for some, for reasons of personal satisfaction and professional growth. Some employees however, as observed, have not been conscientious in attending these advanced computer and information courses, and if ever, these graduates of the courses are not commissioned to do tasks related to the courses studied.

A senior manager noted:

> *"It is obvious that the upper management looks at what we do with disappointment and/ or looks down at what we are doing, so no matter how hard we try, there has been no successful outcome with regard to attendance in training courses. I'm not saying that*

> *we are perfect or we do great, maybe we have a lot to improve, but definitely this is not only our need, all in the organisation need a lot to improve. Unfortunately, we don't feel that we are being encouraged to attend training courses for our benefit". (P14S7)*

One of the participants revealed:

> *"Still, we need more training courses to enhance our abilities to follow-up the new technologies". (P33I4)*

The effect is therefore carried through in the work place, where any change in their regular patterns and when given different roles to play, apart from their usual tasks would prove to be a detriment. They go with the flow; they make do with what they know. One apparent case was when one among the staff requested some one-on-one training from a senior staff member. The requesting person has been with KISR for some 15 years or so in the Institute. As per personal communication with the concerned staff, it was revealed that the request was denied by the supervisor on the reasoning that training on her usual function is no longer necessary and therefore, should not be granted, as she is presumed to have mastered the craft. This is totally a disregard of the principle that education is for life, and that it is both a right and a privilege to advance, hone, and enhance one's skills in order to nurture one's learning and expertise.

Additionally, a researcher was noted:

> *"We have a lack of manpower, not just being undermanned, but more importantly, lack of skilled staff to handle and cope with the*

new area of research or the latest technology. Most are not qualified when hired". (P32R12)

6.4.6 Business and IT Linkage

The interview results revealed that most of the respondents have seen the importance of linking business with IT. In contrast, some of the respondents claimed that the current situation of the linkage between IT and business are not fully convincing and not at the level they want. A senior manager at one of the centres stated:

> *"We are not so satisfied with the level of the integration between business and IT, and I feel that more effort should be put into it". (P28S9)*

Generally, he also asserted that from a management standpoint, the CEOs or the research centre managers know precisely the relationship between the IS component and the scientific research field.

This view is supported by an IT senior manager, when she stated:

> *"I don't think that we have integration in our organisation, I say that because as I see, it should all be synchronised and actually it's not. We are all working on separate islands; the IT group is working like separate islands with the departments, the NSTIC with the STD, with the CTCD, and we also have separate units in the organisation relating to IT, and it's not clear where we are going and where we are coming from. There are verbal directions from the top management, but we vaguely have an idea as to what the upper management thinks of what the IT should be able to do.*

> *We are kept in the dark about a lot of things which we were previously involved in, but not anymore, and we don't know how far these things are going. One example is the website portal; another example is knowledge management. Like for example, now we have this project we told you about—the repository, which we are working at, and then we find out that there is something similar to a repository but not for scientific but for managerial and administrative information, not a repository but something related to their knowledge management system to be implemented which we don't know about; something which we don't know how it's going to be implemented. There is indeed the lack of coordination within the organisational structure and parts". (P37I7)*

One of the interviewees stated:

> *"In my opinion, to increase the level of integration between business and IT, we need to have both of them on board when we develop new strategic plans. Business and IT should work together as one unified entity".(P11S4)*

On the other hand, some of the IT participants expressed that the business should lead the IT and direct it based on the goals of business. Getting the IT people and business involved on all the early steps of strategic planning formulation might help in the integration between them, as stated by one of the senior managers.

A majority said that aligning IT/IS with planning would make matters systematic; information can just be inputted into the system, where all centres of research, support

divisions, administrative, finance, human resources, project management, marketing operations, editing, among others, can have access to the needed information and data, as well as do available indexing and retrieval of past research studies, and other useful concerns, which could benefit not only internal beneficiaries, but even outside beneficiaries and clients, alike.

The case study revealed that most of the interviewees manifested an understanding of the significance of linking business with IT as one the most important factors of having a strong IS alignment within the organisation.

6.4.7 Integration among Units in the Organisation

As revealed by the participants in the interviews, all respondents were actually definite that they participated in the formulation of the strategic plans. To maximise and resolve the lack of integration, one solution posed by an interviewee is to customise procedures in order to fit them to the best practices that need to be employed for the organisation. Given the example, as a senior research manager put it:

> *"The success of a project is likened to a triangle-cost vs quality vs time-standards and measures of whether a project has succeeded or failed; whether a project is effective or not. What really is difficult to achieve is project management within budget and time parameters". (P12S5)*

Apparently, as to purchasing and property control, the retrieval of files and records within and between departments is also not very well-coordinated and integrated. As deduced from the other interviewees of other departments, the same problem held true

to most of the departments, if not to all. This lack of coordination has built up, due to several interlinking factors, and as yet, have remained unresolved.

Hence, it may seem that the interviewees, while they believed that all the critical business activities of the organisation as a whole should be well-supported by the IS/IT; albeit, so much still is to be desired, as far as employee satisfaction is concerned, relative to the support provided.

Departments work as separate islands, and this could be noticeable even between departments in one centre, working like separate units without coordination and integration. There are verbal instructions from the upper management that support should be there, but there is a vague idea about what the upper management wants them to do.

To cite repeatedly sampled responses:

> *"For example, this repository of information which is what the NSTIC is working on. We found out there is one other repository which is being set up and something similar, but this is something that has no relation to scientific information, rather, it is to cover managerial and administrative information, of which we are not informed about, and we don't know how it is going to be done or implemented. They say they have a knowledge management database which will be implemented, but we are not clarified about what it is all about. We are being kept in the dark". (P18R7)*

"We have a couple of major projects, already approved, but we don't seem to get the encouragement, instead, we feel that the management looks at what we are doing with disappointment, so no matter how much we try, I am not saying we are perfect, but maybe we have a lot to improve, but definitely, this improvement should hold true with all of KISR." (P16R7)

6.4.8 Organisational Hierarchy

The findings from the interviews showed that the organisation has relied so much on consultants who support the top management in strategic planning formulation and in providing professional advice and recommendations with regard to critical issues. One of the interviewees said in this regard:

"The consultants were given a free hand in the restructuring of the Institute". (P26RN)

Apparently, consultants, from interviewees' responses, were more constructive and confident that the organisational structure which they themselves have re-engineered, would be more successful when implemented. Conversely, the structure as seen in principle has become more centralised, as the hub of power and authority is concentrated in the upper hierarchy in the respective centres. As already emphasised, because these foreign consultants are on a limited tenure, and more importantly, given no restrictions in the re-engineering of the organisational structure, they are rather liberal and less coping and not familiar with the Middle Eastern culture, being foreigners.

An interviewee realised the importance of having a cumulative and effective organisational hierarchy through his statements:

> *"As to the re-engineering of the structure, the basic strategy should have been to create a fusion of all the organisational groups, from the CEOs to the CIOs, and the IS component, such that all parts of the organisation are interlinked". (P35R13)*

It was inferred from the findings of the interviews that more gaps have been seen in the re-alignment in the organisational structure, roles, and responsibilities, and in different information systems within the different centres, from elicited comments from interviewees and personal observations by this researcher.

6.4.9 Top Management Support

The findings revealed that all communication lines should remain open from top to bottom and vice versa in the organisation as stated by one of the senior managers:

> *"The top management support is very essential in any organisation to get things done, especially if we have a project demanding a quick budget and requiring approvals from outside the organisation, taking into consideration the type of our culture and system". (P37I7)*

Some of the participants felt that they are not being supported by the management in terms of staffing, budget, and moral encouragement to boost their morale and motivate the staff to work harder and aspire, even while they are not highly qualified.

On the other hand, when asked whether their departments' share of services is an added value to the centre, they obviously showed confidence that they are a big support to the organisation, particular to the very senior researchers who have become dependent on the centre in accessing the needed information, much more so in assisting them in identifying high-quality scientific resources.

A senior manager at one of the centres gave out a positive and encouraging comment:

> *"In my experience, any successful project that I have dealt on, full and unlimited support from the top management was provided." (P36I6)*

6.4.10 Organisational Rules and Regulations

The findings showed that the staff cannot gain access to clear-cut rules and regulations, as well as procedures in matters of salary deductions and leaves of absence.

Furthermore, all the four cases are in the transformation process. One interviewee stated:

> *"As a department, it is clear; however, since the organisation is going through structural changes, it is not clear how this will be affecting us. As notified, it will be the same; we just have to watch and wait; generally, as notified, it is going to be in the same direction". (P13S6)*

In effect, there are inaccuracies in the information, indecisiveness of the staff in charge of responding to queries, which could be due to the fact, that either the person is not in the know of these prevailing rules and regulations, or simply, that the software being

used in the system is outdated; or errors, inconsistencies, oversights committed during data entry, in effect, causing some doubts as to the accuracy and authenticity in the elicited information.

One of the interviewees stated that:

> *"Currently, we are in the process of doing a transformation plan in our centres, and I think it is not being clear about whether regulations and rules would have an effect on the implementation of the transformation. For example, the application of project management information systems (PMIS) is facing a lot of challenges. Specially, this system is being used by many departments such as finance, research, and project management office". (P34I5)*

6.4.11 IT/IS Readiness

The outcomes of the interviews revealed that there has never been enterprise resource management or resource planning system. The bottom line is the lack of integration and apparently, no unified systems. A unified system, meaning in that, whatever information about a particular employee in one support unit should be the same information for the employee in another unit.

One of the IT members claimed that:

> *"The system needs updating in practice; because, although it appeared that objectives are clearly stated in theory during the planning stage, implementation of whatever are stipulated in the objectives, is another story. I hope that the transformation of the*

organisation would give rise to a more efficient alignment of the strategy and IS. However, that still remains to be seen, for now" (P36I6)

Another interviewee realised the importance of the technology by saying:

"Social media has become a trendy term and a very effective tool in building networks and relationships. All types of social media have mushroomed, and people get to have access to every information relating to all aspects of human life.". (P17I3)

In a similar vein, a scientific institute within its milieu should have all these networks working, its website booming with all the institute's activities, business capabilities, marketing, e-commerce, which is so popular these days, that anyone can make available online, particularly, results of completed research, not to mention, rules, regulations, jobs, procedures, hiring and screening, public relations, marketing, purchases, e-commerce, etc.

One of the interviews said in this regard:

"We need support; without information services, without access to the resources, researchers will not be able to accomplish anything. Although a lot of the information is now of an open access and are readily available in the internet, our IS has an important role in terms of retrieval of the research studies conducted, other services and current awareness of modern technologies, etc., very much needed both by the older school even more than of the younger school. Younger researchers are more independent in terms of identifying information. The

> *researchers of the old school are more dependent on us; we have a role in terms of actually doing the service for them and with the younger school, in terms of actually identifying the resources that they can use in their research". (P17I3)*

The subsequent interchange of questions and answers took place between IT managers and this researcher to emphasise some points in the conversation.

One of the participants was asked if the organisation has an IT infrastructure ready and if already being applied. The answer was a resounding "*no*". The reason given was that there is no synchronisation in the system, when what should really be is that all of KISR infrastructures and services should be synchronised.

It was observed that divisions associated with the IT department are not really doing IT services. As the interview progressed, it was deduced that there are two divisions that are to be removed from the IT/IS, namely, Technical Services and Information Services which would limit their contribution and share in the overall operation of the organisation, with only the Library, as the major learning resource. Their main role as emphasised is to subscribe to refereed journals and periodicals, purchase books and scientific materials, on top of serving as the repository of digital information, not just archiving, but to provide access to scientific research conducted in Kuwait, basically on areas that may not just be scientific, but a legacy of historical information. The core of the IT/IS functions is left to the Computer and Communications Technologies and Systems Development Division.

Another interviewee explained that:

> *"The process entails that departments of all centres should take the responsibility as well, to coordinate with the IS for a centralised information database system so that a clear coordination and interconnection will be positively realised. This would give the NSTIC more authority and credibility from the beneficiaries, thereby, rendering more confidence in their retrieval and indexing of the needed resources". (P14S7)*

It was noticed that those managers have always known that the IT/IS holds the core of research results generation, dissemination, and technology transfer via a digital database system. Practically, all information about centres should be accessed from the IS departments, each with specific roles from library to technical and information services.

The end-in-view considering the latest trend in IT is a digital databank of all scientific researches on varied fields to be able to serve not only the scientists at the centre, but also the clients and the beneficiaries themselves outside the centres.

6.5 Content Domain

6.5.1 Skills and Experience on IT

The findings of the interviews showed that the IS/IT respondents were definite and clear about their objectives, goals, and participation in the strategic planning. One of the participants supported this idea by stating that:

> *"I think for better alignment, you should first get people involved in strategy planning from day one. The more they understand, the better they would understand the latest trend relative to management, as well as that in the environment. This should involve both the top management and IT at the same time. We need another role for IT. As a rule, it should be well-informed of new changes, and should always be updated and should be the same with business. IT updates it with new information, systems, and ideas. This exchange, I think, is very healthy. We talk about strategy. The line of communication should always be open. I think this represents better alignment between two businesses. What else may enhance alignment; it may be focusing. Some establishments see that business is given more focus and should be more aligned. If all networks are aligned with information systems, all other operations become sustainable strategically". (P10I2)*

However, since the organisation is undergoing drastic changes in the structure, what is not clear is that how this change will affect them as a department. Tentatively, they were told that the usual assigned tasks will remain. Nonetheless, they are on a *"wait and see"* status, until they are told of what direction the Centre is headed to. Every five years, they were always a part of the planning, and they even were candid to say that the previous strategic plans were on a clearer perspective than that of the current strategic plan. The awareness was there when asked whether they have heard of the principle of IS alignment, which is referred to by some authors as strategic alignment or strategic fit.

A senior IT manager noted:

> *"One of the things I forgot to talk about in terms of the skills of our staff is that the reason we are not able to improve is because we can't hire people who are highly qualified in the areas of research and technical work. When we started building this department, we were hoping to attract people with scientific backgrounds so that they will be at the same level with the researchers so that there is better rapport and understanding relative to scientific subjects. But how would that be possible when they are not offered an attractive package in the aspect of salaries, benefits, and bonuses? In effect, those who have the scientific background and expertise would rather go anywhere else where they could be given the privileges that they deserve. The same applies with the IT people. Those with IT qualification are highly in demand and therefore, knowing this, they would rather apply in private firms to get the remuneration deserving of their merit and qualification. Hence, we end up with the less qualified staff. The solution should be raising the salary grade for both the scientific and non-scientific divisions, also referred to as the research and support divisions. As an engineer, I belong to the research/scientific division and I was first assigned at the Chemistry, Biology, and IT departments, but as things changed, we can only hire people with English background or history or purely librarian background so we are getting very limited skills and staff so you can't really improve the services. What we really need are young qualified people with new ideas, which we can't get". (P33I4)*

6.5.2 IT Project Management Skills

The findings showed that it is likewise important according to the interviewees that strategic planning has to be done initially with program managers within the centre so that whatever they have prepared will eventually be presented in the overall actual formulation of strategic plans projected on a five-year term. A succeeding projected strategic plan is presented based on the review of the previous plan, as to whether the departments within a particular centre have fulfilled the corresponding tasks involved as per a project.

One of the interviewees claimed that higher profitability and investment to a new technology on a specific field can only be possible if, before a research is undertaken, a feasibility study is a prerequisite to the actual research, such that the new technology being introduced should have been known to benefit a great number of users. In other words, the research results should be far-reaching and as much as possible, suited to different cultures and settings.

A project manager stated:

> *"The profitability should far exceed the cost of investment within reasonable restrictions in time and effort, additionally, gaining competitive edge in the transfer of technology". (P8I1)*

Another one said:

> *"The concerned centre should have the absorptive skills, along with flexibility to be adaptive and coping with whatever changes*

> *that will come about in time, because in the end, they said, investment does not bring about only revenue, but an added value, i.e., innovation in products and services". (P10I2)*

A project manager argued:

> *"While they were quick to acknowledge that they have been granted the budget for some major projects, this budgetary grant does not come from the KISR coffers, but from Government initiatives". (P33I4)*

It was noted that for the Library, the budget provided was only for the collection and acquisition of resources; yet, not sufficient, as they are not able to supply other departments with the necessary reference materials for their needs.

6.5.3 Top Management Leadership Type

The results of the interview revealed the type of leaders they think could provide harmony in the organisation, as stated:

> *"From my experience, the democratic managers allow more freedom to employees to do the business their own way". (P22C2)*

It was mentioned that the leaders of the old school may seem more in need of their services, as these senior managers have become more dependent on what are available; albeit, for the new school or the younger breed of scientists, they may appear to be more aggressive and independent in their work and management system via accessing high-quality materials from websites and online links.

An interviewee claimed:

> *"An authoritative CEO failed to re-structure the organisation, which caused a gap leading to conflict in the roles played by several departments where even the employees felt uncertainty in their tasks and duties. Also, what made the case worse was that he relied so much on foreign and external consultants. I think the opposite thing would happen if a democratic manager would be leading, and this might lead to a successful implementation of the objectives set for the organisation". (P1R1)*

6.5.4 Top Management Trust Style

The findings revealed different views relative to the top management's trust on IT staff capabilities on the aspect of finding solutions and propositions. Seemingly, the management does not find the staff competent enough that they outsource IT services outside or from consultants. However, it is worthy to note that consultants on specific areas do not stay at the organisation on a longer tenure, but only on a yearly contract, and some consultants who were positioned in this area of strategic formulation, are only consulted during periods of strategic planning and to a certain extent, they have not proven themselves worthy of the benefits they are receiving.

When asked to describe the relationship of IT/IS with the upper management, the answer, as expressed in an evasive, restrained tone was:

> *"It is not as we hope it to be, let's just put it that way," (P33I4)*

The response to the question could be interpreted to have a shade of insecurity, reluctance, or diffidence in the manner it was spoken. While they wanted to be less guarded about responding to certain questions, it would come as no surprise, that they had reservations in giving their comments openly on critical issues, especially concerning employee-management relationships.

One of the interviewees said in this regard:

> *"We definitely need more exposure, more transparency in terms of what is going on, and there is a lot of politics a lot of people taking issues personally, This is mine, you can't take it. We need to get rid of that, but this is difficult, because it is a cultural thing that people can't share information. But, at the end of the day, it is about the organisation. I'm not going to take it home with me, so this is a cultural thing in terms of breaking the wall, in terms of communication between different parts. I think the upper management has a role in encouraging that". (P24C5)*

6.6 Process Domain

6.6.1 The Role of IT in Planning the Organisational Strategy

The findings showed that the IT participated in the fine-tuning of the strategy. Some of the participants also stated that the focus of the strategic planning was more on the research areas corresponding to the demands and thrusts, as projected.

From the interviewees' point of view, there is no cardinal rule to measure effective alignment; what matters is to be able to bring about the latest updates to the end users

and in effect, to bring back to the organisation the maximum returns of its investments. One of the IT staff stated:

> *"Yes, I participated in strategic planning, particularly in SWOT analysis, to know our strengths, weaknesses, opportunities, and threats/risks. We do it or share in this process. I find it very good as it formulates committees, and forms to be filled out, and there are outside reviewers and inside reviewers in these affairs. Priorities are the plans according to what we have planned". (P17I3)*

Another member of IT staff said:

> *"For me, it is very clear, and every one participates at least, seniors, section heads, department managers. We are talking about the five- year plans. We start from the beginning and a given time, evaluating the previous plan and checking what hasn't been achieved, or the accomplishments, and we then give remedies/solutions". (P34I5)*

In practice and in theory, IT/IS department has the primary role in aligning all these organisational, as well as business activities of the Institute, so that the objectives set are achievable and met toward a central goal, that of creating for the organisation a favourable image of a Centre for Excellence in Science and Technology, eventually to a higher level of being the Lead in technology transfer not only in the local, regional, but in the global scientific arena, as well.

Although this key function is clear-cut, there are obstacles faced in the process, i.e., by not being able to function as it should.

6.6.2 Clear Goals and Objectives

Some findings revealed that from the perspective of the senior managers and different scientists in the different centres, they all said that their objectives are clearly specified; strategy is well-focused and well-defined.

A participant said:

> *"The strategic goals and directions are so properly aligned with the 2030 vision of the country relative to the environmental management program, as well as to the people's quality of life". (P2R2)*

Another participant provided a similar answer by stating:

> *"The previous strategic plan, as well as the current one is clear; every 5 years, we formulate a strategic plan and an operational plan based on the strategic plan every year". (P15R5)*

Another interviewee declared that all these project plans and future activities have been discussed and have been given advice and expert insights from the consultants on specific areas.

It is worth emphasising that regardless of whether objectives are clearly stated and focused, the whole Institute is at present in a period of change, especially in its organisational setup; hence, they are unsure about how these changes will affect the

performance and the productivity of every centre in the long-run, relative to the objectives set and the end goals projected.

An interviewee posited:

> *"We believed that it still is premature to say whether the current formulated strategic plan will be successful or not; clearly, the objectives are well-set, and goals may expectedly be attained; however, the question would be, whether the IS will be able to deliver the services which are expected of them, i.e., the beneficiaries being able to access the information resources generated from completed projects via the system". (P9R4)*

6.6.3 Role of Business in Planning IS Strategy

It was observed that the responses from a majority of the respondents implied that they have, to a certain degree, a good understanding of the strategy being employed in the planning process.

For most of the senior managers, they stated that more challenges will be faced by SR&D organisations, as this effort at IS/IT alignment progresses.

Also, it was observed that the consultants were known to have a direct participation, particularly in the formulation of the Seventh Strategic Plan, which gave birth to the name "Transformation period, as envisioned" by the leadership.

6.7 The Emerging New Factors

During the analysis of the interview findings, some new factors have emerged which have strong effects on IS alignment as explained in the following sections.

6.7.1 Smart Business and Creativity

The findings revealed that there is a need to establish a new department called the Smart Business Unit to deal with new and innovative opportunities and ideas that could lead to enhance and develop the business and bridge the gap between business and IT.

As one of the interviewees stated:

> *"According to my work experience previously in the banking sector, I would suggest that a unit be established to be responsible in creating smart ideas in order to develop the performance of the organisation. This unit is to monitor and explore the latest innovative ideas and solutions in this field locally and globally". (P34I5)*

In this regard, also, the importance of having such unit was emphasised by one of the participants stating:

> *"It's essential to have a well-structured directorate following up with the organisation's staff to find out any new creative ideas that would be valuable for the organisation. I think having such would increasingly affect positively on the overall work performance and quality. I believe that adopting and*

encouraging the talented employees within a healthy environment would lead to incredible outcomes. Currently, there is a temporary committee that handles this kind of tasks, but unfortunately, this committee lacks the command and supervision". (P12S5)

6.7.2 Clarity in Policy, Responsibility, Roles, and Procedure (PRRP)

The results showed that KISR does not have approved PRRP manuals, and that has caused ambiguity in understanding staff duties and rights. Furthermore, the lack of these manuals can cause confusion in functions, overlapping of responsibilities, as well as displacement of qualified staff in the proper performance of duties and tasks, hence, the difficulty in integrating IT strategy with organisational strategy.

One of the participants pointed out that:

"In this organisation, we are suffering from interfering between a lot of duties and responsibilities with other departments; this can cause a major delay on performing the business and a duplication of roles.". (P20C2)

Another interviewee stated that:

"Over the past 20 years, I have participated in developing and enhancing PRRP manuals but unfortunately, these manuals have not as yet met the approval of the top management. Very often, these manuals have only gone as far as the second highest in the hierarchy, such that the topmost level does not

have any inkling as to what guidelines or manuals are being used. There lies indeed a misrepresentation of decision making which is more often left outside of the domain of the top leadership. This may even be tantamount to a disregard or a disrespect of authority and abuse of designated power". (P9R4)

6.7.3 Clarity of Job Description

This was one of the new emerging factors, which is having an updated job description for each job at KISR. The job description should be comprehensive and should have full detailed reference for all the jobs. Each job description has to meet the duties and responsibilities assigned for the department for IT alignment to be recognised and eventually, realised.

A participant confirmed the importance of having an updated job description by saying:

> *"In fact, I face some difficulties in understanding my job description and duties that I am assigned to, and I think that is because no regular updating is being done in the job description documents at KISR". (P33I4)*

Another interviewee said:

> *"When I joined KISR 15 years ago, I saw in the contract my duties and responsibilities; but as the years passed, changes have evolved; so many things have changed; departments were either formed or were given new names which resulted to outdated job*

description. I have been trying to get the updated one, but all in vain". (P21C3)

Moreover, one of the participants stated:

"I had a chance to look at some similar organisations, and I have seen excellent examples of job descriptions, which KISR fails to have ". (P25R9)

6.7.4 Business Continuity

The results of the interviews showed that in order to increase the level of IT alignment, it is mandatory to keep the business relying on the technology all the time, which means having the systems up and running. The high availability is very important for business to trust IT, and that means finding ways of making the data secure, protected, encrypted, saved, restored, and recovered, when needed.

Another interviewee posited:

"I believe that the IT department should take the right actions to guarantee that all our data and business applications are working perfectly without any outage. My concern is how our data could be safe". (P10I2)

An IT staff member argued:

"We are well-prepared for having a good communication with business by providing all requirements of business. The IT

> *infrastructure is excellent, and all necessary systems and hardware are well-equipped. We know how to make business work and become sustainable, ie., to cooperate and integrate with the IT department". (P8I1)*

In this regard, another IT staff member opined:

> *"IT department cannot work alone without the business involvement. Business should be engaged in our projects and this leads to having a very strong relationship with business. I think business should put some effort to maximise the level of integration". (P37I7)*

One of the senior managers remarked:

> *"I always am apprehensive about losing our data and files, besides I cannot imagine how we can react in case of disasters or failures. I need to see how IT would be able to manage and settle such things". (P28S9)*

6.8 Chapter Summary

This chapter has explored the critical success factors that could have possible effect on IS alignment by conducting interviews involving people from different levels in the structure. Thirty-seven staff from four centres of research were interviewed. Based on the *a priori* codes previously identified from the literature and the proposed

conceptual framework, as shown in table 4-5. The results taken from the interviewees' comments were classified based on the three domains, namely, context, content, and process. All interviews and the responses were transcribed, then, the final template was constructed, basing it from the generated information after the coding analysis. There were seven major themes along with 18 codes. In addition, there were four emerging factors detected during the analysis of the interview sessions results.

The next chapter deals with the development of a holistic understanding of IS alignment with organisational strategy.

Chapter 7: Discussion

7.1 Introduction

This study has used a qualitative exploratory single case study design. Firstly, Chapter 2 presents a literature review and demonstrates the lack of relevant studies of IS alignment in this particular SR&D field of study from the perspective of practice. Moreover, a detailed discussion is presented; a set of success factors have been selected as a core base for understanding IS alignment in organisations. Secondly, a conceptual IS alignment investigative framework has been developed and explained in Chapter 3. Thirdly, research case study has been conducted to acquire a more in-depth understanding of the problem and to be able to obtain the required data for analysing and interpreting the complex factors involved in IS alignment, as presented in Chapter 5. In chapter 6, the findings of the case study are presented, employing a qualitative analysis of the results.

This chapter discusses the findings of this study and proposes a practical road map for enhancing the practice of aligning IS with organisational strategy. The aim of this chapter is to present a clear and critical discussion of the results presented in Chapters 5 and 6.

The discussion is categorized in 3 domains, namely context, content, and process; an updated framework; and a road map for enhancing the IS alignment. Figure 7-1 shows the revised framework.

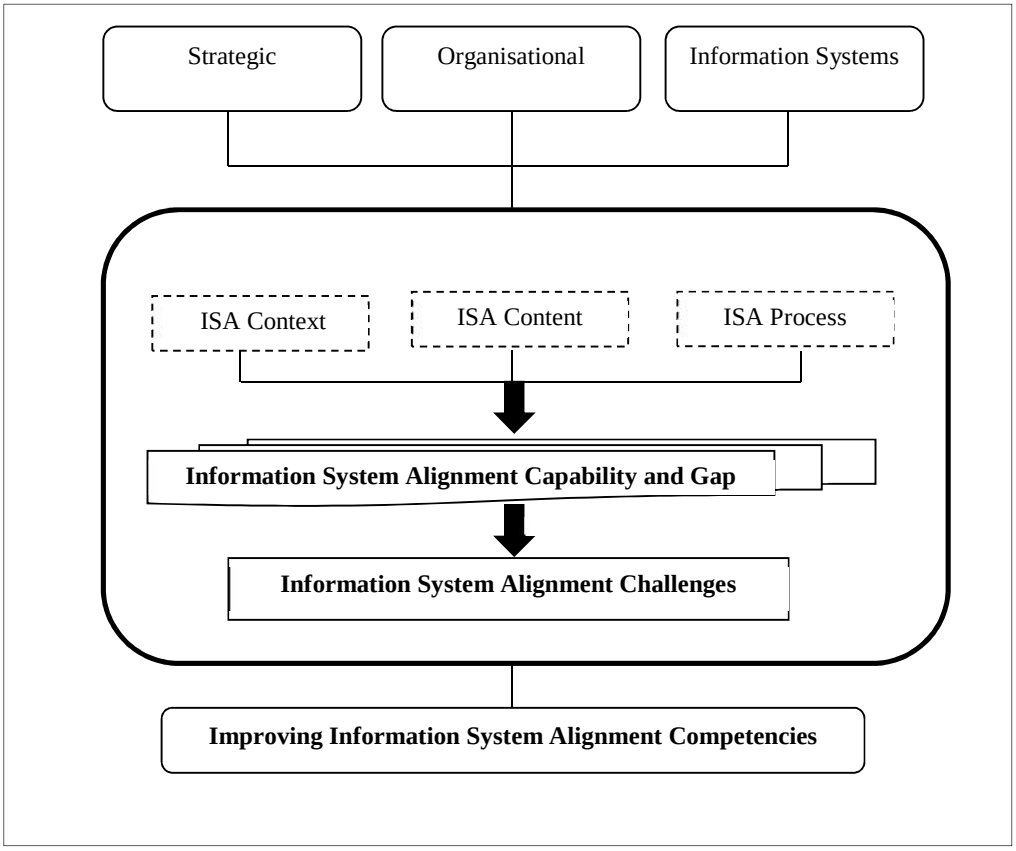

Figure 7-1: Revised framework

Based on results of the interview analysis, the revised framework shows the main three groups affect the level of ISA in SR&D organisations. The first group is the Strategic

team in the top management level. Staff represents the counselors, the administrative managers are named as Organisational group and the third group is the IT team. According to the conceptual framework that discussed on chapter three, all critical success factors of integrating IT with organisation strategy are classified under three dimensions; context, content and process. Examining ISA dimensions will allows to identify the gap that effect the integration, it will also the organisation capabilities to achieve the alignment. Furthermore, examining ISA is a vital process to discover the challenges and to set a plans to deal with the require action in order to improve the level of integration.

Furthermore, Figure 7-2 shows a Critical Success Factors (CSF) tree developed based on the research revised framework. The CSF tree explains the linkage between the contextual theory of Pettigrew (1988) and illustrates context, content and process critical success factors. The CSF tree adopted as a thematic tree map that summarises nodes compared by the number of items coded.

7.2 Context Domain

The context domain, external and internal issues will have an influence on achieving IS alignment by KISR as discussed in the following sections. As discussed in chapter 3 and 4, the context domain includes a number of CSFs shown in Figure 7-2

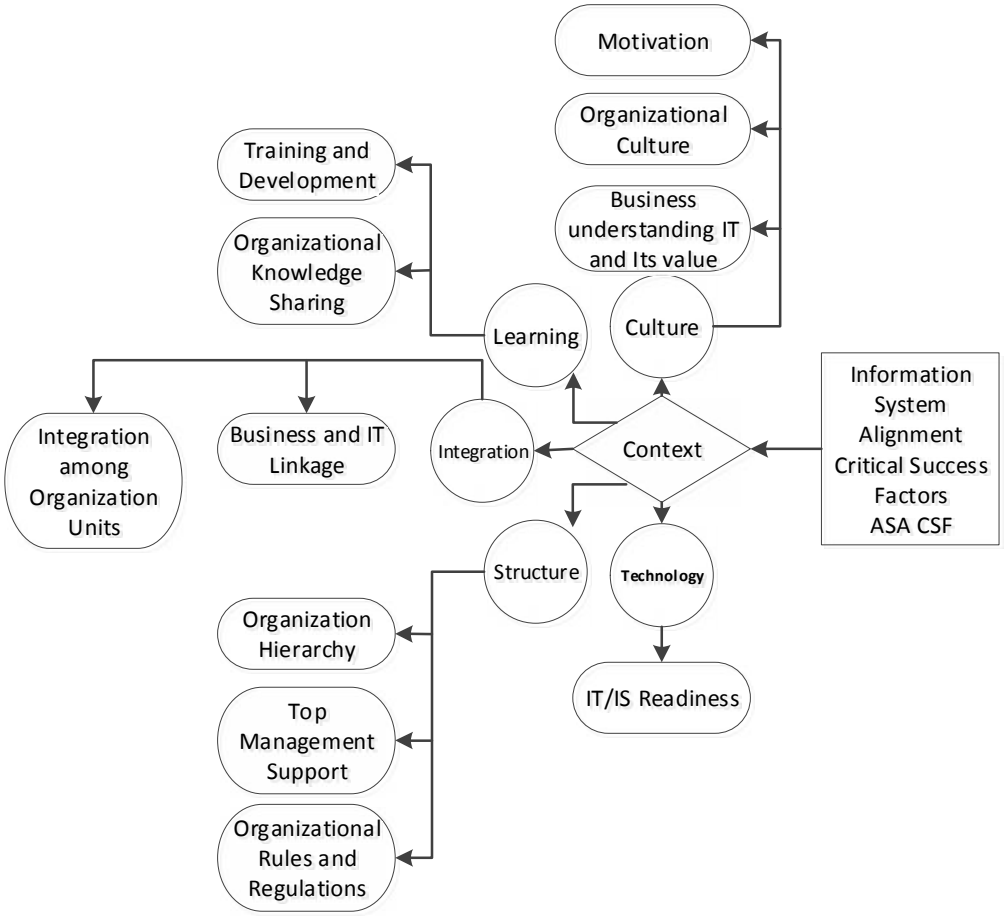

Figure 7-2 Context Domain CSFs

7.2.1 Business Understanding IT and its Value

The case study findings showed that this factor is very important and has a positive and significant effect on achieving IS alignment. The findings revealed that the senior managers and the researcher both had a better understanding of IT and its value, and that is most likely because they are more schooled, involved at a higher level in the organisation, and have a greater knowledge of the goals of IT and the business

Clearly, the upper management, senior managers, and executive's support will be a positive driver towards achieving IS alignment, and this driver is recommended to be taken seriously in this regard. These findings reflect those in the literature such as in the study of Luftman (2003a), Teo and Ang (1999), and Luftman (2003b), which highlighted business to understand the value of IT as a driver to achieving IS alignment.

CIOs are responsible to convince CEOs about the importance of IT in achieving the strategic plan objectives. Luftman (2003b) affirmed that:

> *"It's not enough to have excellent IT strategies and implementation plans on paper. CIOs must convince peer executives of the corporate value of their strategies. Some CIOs are very influential, and several factors contribute to this. CIOs should have an intimate knowledge of the business and industry they're working in, thereby improving their interactions with business executives, and they should have personal relationships with the other executives in their companies". (p.3)*

Moreover, Chan and Reich (2007b) noted that the absence of considering the importance of the role of alignment is a challenge based on relating to a practitioner's perspective.

7.2.2 Organisational Culture

The findings from the case study in Chapter 6 revealed that the KISR organisation has a slightly different culture and characteristics than the other Kuwaiti organisations. Although, this organisation is a scientific institute which has scientists, researchers, and very highly educated and skilled workers, seemingly, the culture of this organisation is affected by the level of the education of employees. Therefore, affect of KISR culture on ISA need to be explore.

Indeed, the national culture in Kuwait has its effects on the organisation culture with some unique characteristics. This factor shows a negative effect on the application of IS alignment at KISR and could be a barrier. The upper management understands this issue very well and is planning to implement a big change management project. This project will change the attitude and bad habits in the organisation to be more systematic and towards becoming a professional entity. This will be an advantage towards making the organisation capable of adopting any new technologies, innovations, and applications, such as IS alignment.

This factor is very important and should be considered in any future strategic planning. The individuals at all levels of the organisation have to be involved in such plans, and patience is one key element in this matter. Changing the people and their practice, habits, and behaviour is a challenging and difficult step. These findings reflect those in the literature, such as in the research of Kappos and Rivard (2008), Nickels and

Janz (2010), Hill et al. (2012), and Waring and Skoumpopoulou (2012), highlighting culture as a potential barrier to IS alignment.

7.2.3 Lack of Motivation

Based on the findings, motivation becomes less when the staff lose their rights and feels that the culture is disrespectful. All staff at the organisations should be treated equally and fairly. The organisation has to provide the staff all rights and privileges that they need. Self-motivation is however also required of the staff. This factor was found to have a negative but significant effect on the application and achieving IS alignment.

The senior managers do not see this factor as a show stopper towards achieving IS alignment. This is because not all senior managers have full rights and privileges. It is recommended that the motivation for the employee be provided for and increased through loyalty and rewards programmes. These findings are reflected in the literature, such as in the research of Decoene and Bruggeman (2006). In addition, Teo and Ang (1999) noted that IT staff have to be motivated in order to respond to the needs of users. Moreover, they argued that the IS department is required to bring about innovative methods for the firm to strategically apply IT.

7.2.4 Organisational Knowledge Sharing

The findings from the analysis of the qualitative results in Chapter 6 showed that knowledge sharing is a slightly less important factor but has a positive effect on achieving IS alignment. Some of findings pointed out to the importance of having a shared pool of knowledge among organisation centres. Sharing the knowledge and exchanging it between departments and staff would lead to a more knowledgable and healthy environment which could facilitate the quick and successful implementation of IS. It has been observed that healthy and prolific knowledge sharing among the teams could also enhance and improve preparation and formulation of strategic plans. However, knowledge sharing still is either absent or lacking among some centres. It is recommended that all centres be instructed to share and transfer whatever knowledge they have relative to policies and procedures if only to help each other in coming up with an effective and efficient preparation of policies, procedures, as well as additional know-how for a better and more coordinated working environment in the organisational structure. These findings confirm those of previous studies, for example, the research by Luftman (2003a) and Chan et al. (2006b). Moreover, Reich and Benbasat (2000) stated that shared knowledge between business and IT executives would potentially influence alignment.

7.2.5 Training and Developing Human Resources Skills and Expertise in the Organisation

The findings presented in Chapter 6 revealed that training is a significant factor and has a positive effect on achieving IS alignment. This reflects the importance of training all staff based on their needs and specialised fields. The trained staff would help the organisation apply and achieve IS alignment, especially when the organisation, particularly the Training Department is equipped with a well-designed training program to cover all aspects that are needed relative to change management, strategic planning, project management, IT essentials, etc. After all, there really is no end to learning and education, as well as in nurturing one's skills and specialised areas.

It is worth noting that some of the staff are less willing to attend training courses, not only because commitment to attend is lacking, but also in that, the staff think that attending training courses is not beneficial to their professional growth and promotion in the workplace. Commitment and self-growth are requisites in order to savour the benefits of learning and knowledge generated from training and interaction with lecturers, but because there is the absence of motivation from the management; hence, attendance to training has never been appreciated nor accepted with full commitment. This is where the organisation should be adept in managing ongoing crash courses and on-the-job training for every employee. However, if the employee is not given that much motivation, he could also be defiant to apply IS alignment. The majority of participants think that this factor has a direct effect on achieving IS alignment. It has

been advised that special training be targeted to the involved staff in the IS alignment project. Previous studies in the literature such as those of Morton (1991), Henderson and Venkatraman (1993), King and Teo (1996) have highlighted this factor and its importance as an enabler to IS alignment. Luftman (2003b) supported this fact by confirming:

> *"Going beyond the traditional considerations such as training, salary, performance feedback, and career opportunities, there are factors that include the organisation's cultural and social environment. For example, is the organisation ready for change in this dynamic environment? Do individuals feel personally responsible for business innovation? Can individuals and organisations learn quickly from their experience? Does the organisation leverage innovative ideas and the spirit of entrepreneurship? These are some of the important conditions of mature organisations". (p.12)*

7.2.6 Business and IT Linkage

In general, as revealed in the interview process, an agreement was established on the importance of the linkage between IT and business. Some participants argued that this factor has no critical effect on achieving IS alignment. This could have been because the participant did not properly understand the value of linking IT with business.

To attain a better and quick alignment, it is vital to have a direct link and communication between IT and business in order to understand each department's need, and this may leads to successful or better implementation of IS alignment.

At the senior level management, the relationship between IT and business is well-known and defined, but still, the integration among the departments in the organisation is non-existent. Each department works independently and isolated from the others. It was more of an informal way of communicating from the top management to the bottom, devoid of any formal procedure, thus, the lack of a sure and authentic method of communicating IT and all departments in KISR.

The IT department should provide and suggest new systems without getting the business involved in the analysis and developing stage. On the other side, the business departments do not share their goals and need to the IT department. This gap creates a lot of difficulties to enhance the linkage between the two departments. Simply put, coordination is deficient or amiss, if not altogether, missing.

To solve this issue, it has been suggested that the business should lead the IT and manage it based on the goals and objectives of business. Evidently, this factor is critical and should be taken seriously into account when it comes to achieving IS alignment. These findings reflect those of some previous studies, such as the research of Presley (2006), Coleman and Papp (2006), Wehmeyer (2005), Motjolopane and Brown (2004), who identified this as a key success factor toward achieving IS alignment.

7.2.7 Integration among Units in the Organisation

Seemingly, there is no proper integration among departments at KISR. Each department works separately without any official matching which causes a sharp clear-cut disintegration. The current hierarchy of the organisation does not support having an acceptable integration. This factor has a significant and negative effect on achieving IS alignment. All results pertinent to this aspect showed that there is a real problem in the organisation. It is worth mentioning that some departments claimed that the reason behind the poor integration stems from the other departments, in other words, passing the blame one to the other. Apparently, this is a defence mechanism among people who do not wish to be held liable for some dereliction of duties and/or responsibilities, and to a certain extent, ignorance of the supposed functions of the department or unit.

To pose a solution to the prevailing problem, some of the participants in this study implied the need for a revamp in the whole organisational structure and hierarchy, in addition to setting up new procedures to govern the relationship and integration among the departments. These findings reflect those in the literature, such as the research of Morton (1991) who stated that the effectiveness of organisational frames and partitions and the linkage between sections and departments are key success factors in a successful IS alignment. Henderson and Venkatraman (1993, 1999) and Earl (1997) also espouse this idea.

7.2.8 Organisational Hierarchy

It has been noticed that the consultants have played a weighty role and influence on the hierarchy of the organisation. The consultants have established a new hierarchy for the whole organisation, but the end result was an overwhelming disagreement and unacceptance from the majority of the staff. The concern was more on the overplayed role that the consultants have in the restructuring without due concern of the Middle East culture and that of KISR, not to mention having to consider the sentiments of the staff and some disgruntled senior personnel. Some of the interviewees suggested having a consulting team to consist of Kuwaiti consultants to brainstorm with the hired foreign consultants. Having this kind of consultation could facilitate and hasten implementation of a well-defined and well-structured organisation, taking into account all things prevalent in the KISR milieu. The new structure from this shared

knowledge can expedite the adoption of applying IS alignment in the organisation. It should be designed or reformed to meet the goals of the organisation.

This factor may be looked at to have a negative effect, but however significant to achieving IS alignment. The current situation at KISR from an organisational hierarchy perspective is not within acceptable standards; it is centralised, and lacks flexibility, thus, hindering productivity not only to the organisation but to the whole population of the Institute. The current organisation structure considered as an obstacle for innovation and IS alignment. Various previous studies agree that this is crucial to IS alignment, such as those of Galliers et al. (2012), Gimenez & Rey (2004), Chan et al. (2006)(Cram et al., 2015), and Luftman and Zadeh (2011).

7.2.9 Top Management Support

The support from upper management is essential and will have a positive influence on achieving successful IS alignment. It is common knowledge that any project that has the full support from the top management would have greater chances of success. At KISR, a strong bias is clearly seen particularly in certain projects, thus, resulting in a lack of commitment from the departments. Some departments suffer a prejudicial treatment when it comes to top management support, particularly in the aspect of funding.

The majority of the answers showed that the respondents understand the importance of the support from top management. Again, this top management support is another

crucial aspect. The management should be fully convinced and willing to boost IS alignment in the organisation if productivity and high level of performance among staff are indeed desired. These findings reflect those in the literature from the works of Baker (2004), Davoudi and Oraji (2012), Besson and Rowe (2012), and Li and Tan (2009) who identified top management support as a key motivating factor towards integrating IS with organisational strategy.

7.2.10 Organisational Rules and Regulations

The findings revealed that the rules and regulations at KISR are not clear and cannot be accessed by employees at both organisation and individual levels. Apparently, transparency is absent in the organisation, such that employees are not aware of a clear-cut definition of roles and responsibilities, as well as not being informed of the actual rules and regulations, particularly from Personnel and the Human Resources offices. Being aware of the rules and regulations of the organisation and being accessible and available for retrieval from the database in every department could help to achieve the implementation of IS alignment.

This factor reported a negative effect that hinders achieving IS alignment at KISR. KISR is at this stage undergoing transformation. The transformation process should go with a reformulation of the rules and regulations that match with the prevalent environment, so that a healthy working atmosphere and IS alignment would be possible and workable. Some previous studies have also highlighted that without well-

structured and clearly defined rules and regulations with the accompanying transparency with all staff have access to, would pose a strong barrier towards achieving IS alignment, as shown in Strens and Dobson (1994), Hill et al. (2012), Hu and Huang (2005), and Earl (1989).

7.2.11 IT/IS Readiness

IT infrastructure, whether hardware, software, or information systems, have a positive and significant effect on achieving IS alignment. The findings showed that there is no Enterprise Resource Planning (ERP) system that handles all the electronic operations of the Human Resource, finance, logistics, support, and training in one single unit. The absence of such systems could negatively affect achieving IS alignment. Some participants suggested that IT infrastructures have to be readied and prepared to be able to handle all the business needs in one centralized system, and all members in every department should be given access. These findings are mirrored in the literature, such as from the research of Hann and Weber (1996), Amrollahi et al. (2013), and Morton (1991) who highlighted IT/IS readiness as a factor of notable significance.

7.3 Content Domain

The content domain issues have a significant influence on KISR's IS alignment as discussed in the subsequent sections. the content domain includes a number of CSFs as shown in Figure 7-3

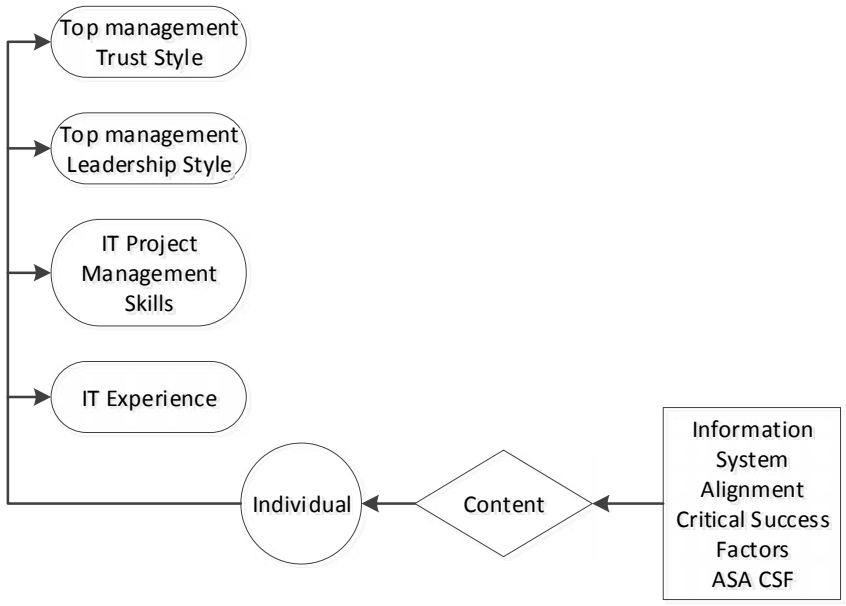

Figure 7-3 Content Domain CSFs

7.3.1 Knowledge, Skill, and Experience in IT

Any staff hired for the purpose of working as an IT specialist should be endowed with the corresponding knowledge, skills, and work experience on IT, as these are vital requirements to help the organisation achieve IS alignment. Skilled and talented IT people are very valuable but are however, difficult to find and hire. They command an attractive and highly motivating package which includes salary, benefits, and bonuses which the Institute is not likely to offer. One other problem is the fact that there are very few experienced, qualified, and highly skilled IT people in the market. As per policy, a fixed salary scale for employees of KISR is being complied with, and

thus, KISR does not allow itself the liberty to grant exceptions in terms of offering a more rewarding salary package to highly skilled and professional applicants. This policy is detrimental and poses a constraint to the overall structure, as it may likely be a cause of not being able to synchronise activities of all the parts in the organisational structure, to include as well, proper coordination and collaborative efforts of all units and constituencies in the Institute. From a holistic perspective, all parts of a system should work together with all activities, plans, policies and procedures to achieve a unified, well-organised, synchronised, and accessible for allowing knowledge, skills and experience sharing in order to achieve ISA.

The experienced IT staff provide the groundwork and the substance in the IS alignment plan. If KISR were to hire skilled and experienced IT staff; then, it should be willing to pay a higher price in exchange for a higher return of investment. If KISR is more than willing to generate a pool of qualified and high-end researchers to gain quality accomplishments; then, it is imperative on the part of the Institute to also exercise flexibility in its policies on screening and hiring IT experts. This flexibility in the system would be a great contribution in achieving the IS alignment plan. Nonetheless, to at least alleviate and overcome the shortage and lack of experienced and qualified IT staff, a suggestion was articulated by one of the senior managers. Designing and implementing an extensive and well-tailored training program to embody basic and advanced IT courses and simultaneously inviting highly qualified IT experts as lecturers and workshop facilitators could be a probable option. This factor is considered as a very important driver towards successful IS alignment, as

could also be found in the research works of Henderson and Venkatraman (1993, 1999) and Luftman (2003a).

7.3.2 IT Project Management Skills

Managing the IT project is not easy; it is highly demanding; it requires good reason, wise judgment, able leadership, and wise decision making among managers. Skillful project management is a factor that has a vital impact on achieving a successful IS alignment within time, scope, cost, and quality parameters. The IT project managers are the ones who will implement any project at KISR. They should be involved in strategic planning, and they have to coordinate with business all the time during the project life time to ensure long-term benefits and growth in productivity and returns of research investments.

It has been observed that IT project managers are working inside a small internal department, and this is not the good practice. They should be located at a department called Project Management Office (PMO); this department should be reporting to the CEO directly. The purpose of this department is to manage all projects over all KISR Centres, and part of the duties is to develop and apply policies, standards, and procedures such as Project Management Institute (PMI) and Project Controlled Environments (Prince2). These findings reflect those in the previous literature such as the studies of Voss (1989), Ken (1995), Wainwright and Waring (2004) who identified this factor as a key motivating tool to a successful IS alignment.

7.3.3 Top Management Leadership Style

Leadership styles are varied and to an extent, distinct in every leader or manager. Some leaders may be authoritative, demanding, and controlling; while others are democratic, patriarchal, and too resisting when it comes to accepting changes within and outside the organisation; others, very political; some, weak and compromising. Nonetheless, all these have their advantages and disadvantages; some may be useful; others may be detrimental to the organisation, partly, or as a whole. What is important is for a leader to be able to exercise a set of values that would direct him to achieving the best interests for his people and the organisation that he serves and holds. He should be endowed with the proper composure to accept and adopt whatever changes are deemed necessary to the organisation's growth, the mettle to resist changes that will prove damaging to the healthy work environment of the organisation, and the prudence and good sense to distinguish which changes are desirable and which are not, with the accompanying foresight and a futuristic outlook for the betterment of the organisation as a whole.

In the observations and interviews with the select respondents, responses indicated an absence of knowledge sharing from the top management. The powers that be are not open in their knowledge sharing; they are not willing to delegate tasks and responsibilities to their subordinates, in effect, authority is centralised; people are not given the occasions to manifest what they know and what they can do; those in power are too restrictive and limiting when it comes to employee's professional growth, as

well as their potentials in contributing worthwhile ideas to the organisation. In essence, leadership style is a critical factor to either cause success or failure in IS alignment.

The elder managers mainly tend to keep things without changes and are afraid of taking the risk for starting or experiencing a new development. This could reflect negatively on achieving the IS alignment plan. These findings echo those in the literature in the works of Besson and Rowe (2012, 2011), Johnson and Lederer (2010), and Raymond and Croteau (2009) who highlighted leadership style as a potential enabler in IS alignment.

7.3.4 Top Management Trust Style

The trust between IT and upper management is critical and important. If trust is absent or even only minimal, no alignment is possible. The IT team should initiate convincing the top management about their ability and capability of running the office in a way that is helpful to the business towards its potential for improvement.

The absence of trust could greatly impact achieving IS alignment in the organisation. This factor should be seriously taken into account, and bridging the gap between the IT and upper management is of urgency. Some previous studies have also highlighted this critical success factor to have great significance in achieving IS alignment, such as those by Davoudi and Oraji (2012), Luftman and Zadeh (2011), Ismail and King (2007), and Downes and Mui (1998).

7.4 Process Domain

The process domain issues will have an influence on KISR having to achieve IS alignment as discussed in the subsequent sections as shown in Figure 7-4

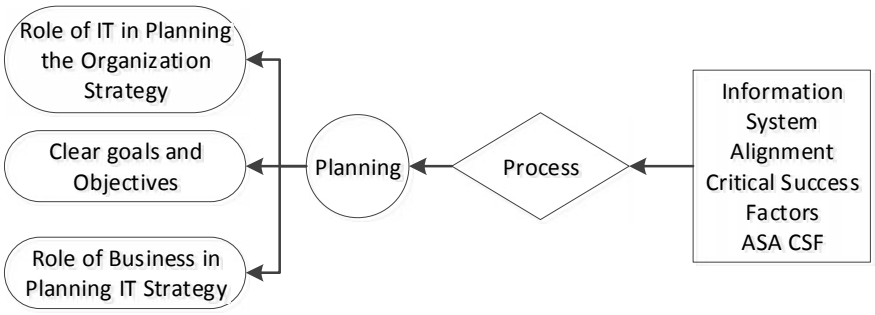

Figure 7-4: Process Domain CSFs

7.4.1 Role of IT in Planning Organisational Strategy

It is worth mentioning that the IT group have played an important role in developing the strategic plan for KISR. The office participated in the 7th strategic plan and their participation posed as a good driver to better achieving IS alignment. Their positive and proactive involvement in the strategic planning process indicated the comprehensiveness in the aspects of IT and business alignment plans. Hence, this is another critical success factor, and if done from a comprehensive standpoint could very well be significant and a positive contributor in the IS alignment process. These findings reflect those in the literature in the works of Presley (2006), Gimenez and

Rey (2004), and Luftman and Brier (1999) highlighting the role of IT in organisational strategic planning as an imperative driver to realising IS integration.

7.4.2 Clarity of Goals and Objectives

The findings revealed that the current strategy has clear goals and objectives. Clarity is an important attribute in assisting all KISR constituents in their participation in targeting realisation of the Institute's goals and objectives. Having clear goals and objectives is critical in effecting successful IS alignment. These findings reflect those in the literature in the works of Teo and Ang (1999) who stated that informing CIOs about the objectives of business unit plan is an important concern to achieve success in IS alignment. This is because CIOs are instrumental in formulating the goals and objectives of the organisation, and they should be well-equipped with a clear perspective as to what the organisation needs to work for and achieve in the aspect of productivity and growth.

7.4.3 Role of Business in Planning Organisational Strategy

Undoubtedly, the business sector in the organisation understands how important its involvement and participation in strategic planning. For one, the business people should realise that a successful undertaking could lead to higher productivity and cost effectiveness and profit. As observed, the business departments have manifested effective participation in the strategy preparation. Evidently, business involvement is

a critical success factor in achieving IS alignment. Preparation in the aspects of functions, operations, and physical structure should be done with passion and with extreme concentration to really have a successful adoption of any planned technology. Whipp et al. (1989), Luftman (2003a), and Henderson and Venkatraman (1999) drew attention to the weight of the role of business in integrating IS with organisational strategy.

7.5 New Emergent Factors

Additional emergent factors have surfaced after analysis of the findings. These factors are significant and might have their effect on the application of IS alignment at KISR as an SR&D organisation. The factors are explained and discussed in the succeeding pages.

7.5.1 SMART Business and Creativity

The SMART business unit is aimed at creating new innovative ingenious ideas that can help the organisation expand possible opportunities to successful implementation of IS alignment. Senior managers have proposed establishing this business unit in order to force upon KISR people creativity enhancement. The role of this business unit is to propose doable and feasible smart ideas for execution and realisation by the designated departments within the organisation.

7.5.2 Clarity in Policy, Responsibility, Role, and Procedure (PRRP)

The lack of PRRP manuals is apparent at KISR. Furthermore, there are some PRRP covering several departments but the clarity in these manuals is non-existent. Markedly, clarity in PRRP is an emergent factor that surfaced and may be said to have an important relevance in achieving IS alignment.

7.5.3 Precision in Job Description

Analysis results revealed that job descriptions for all KISR staff are outdated and showed incongruity with the manner in which departments should function and deliver their services. In effect, this bad fit in the organisation has led to low work performance and even a slump in the morale of the staff. Precision in writing down the duties and responsibilities in every job title should be required, and the people holding such job titles should be well-informed of their duties and responsibilities to improve their work performance and productivity. This is as much a right and a privilege of every member of the organisation, as every staff is a key and crucial part in the organisational structure and is a contributor to the success and development of the whole system. An implication here is that precision in all job descriptions is another decisive success factor in achieving IS alignment.

7.5.4 Business Continuity

Undoubtedly, the organisation realises the significance of business continuity for linking IT strategy with organisational strategy. Any SR&D organisation should be required to consistently promote their capability and sustainability in delivering their products and services at the satisfaction of their end users. Although, IT is a key driver supporting all business functions; albeit, the business sector in the organisation has to be prepared in the aspects of their functions, finances, and operations in order to achieve a successful communication and interrelations between IT/IS and business requirements.

7.6 The Revised Framework

After conducting the qualitative data analysis as presented in Chapter 6, a revised framework has been developed. The revised framework has taken into account the new emergent factors that have been discovered to affect IS alignment. The revised framework has been projected to shape and identify the key determinants and their context for a better understanding of the nature of the problem in a more detailed perspective.

In the process of building a framework for the case institution, KISR, Pettigrew's theory has been most helpful, relative to his three domains, content, context, and

process. Markedly, these three domains incorporate significant factors contributing to an ideal model for SR&D institutions.

For the context domain, the original model shows how factors like business understanding IT and its value, organisational culture, motivation, organisational knowledge sharing, training and developing human resources, skills, and expertise in the organisation, business and IT linkage, organisational integration, top management support, clarity in organisational rules and regulations, and IT readiness would lead to an achievement of IS alignment. An understanding of IT by the business sector is a positive driver toward the desired alignment. The culture in the organisation needs to be sustained and fit strategically. Imperative in the organisation is the motivation that needs to be provided fairly and rightly, most especially to senior managers, who in turn, will provide motivation to their staff. Organisational knowledge sharing should be strengthened between IT executives and the business to encourage values of selflessness and working for the best interests of the whole organisation. This selflessness can branch out into training and developing human resources, their skills, their expertise which could result to commitment. Business and IT linkage, clarity in rules and regulations, organisational integration can lead to a better understanding and communication between and among departments and staff; while alongside, top management support is a must. Finally, content-wise, IT readiness among the organisational members will ensure that the IT is prepared to handle all business needs in one centralized system, all the needed information, available and accessible to all.

Meanwhile, for the context domain, the author stresses on staff having the IT knowledge, skills, and experience, given the rightful monetary remuneration and privileges. The staff IT expertise should be supported by IT project management, alongside the top management leadership style and trust, because in context, these factors will have remarkable impact to achieving IS alignment.

In the process domain, Pettigrew (1988) likewise considers the role of IT in planning organisational strategy, clarity of goals and objectives, as well as the role of business in planning organisational strategy.

In the research, this original framework was employed as its conceptual framework in the building of a revised framework that will be suitable to KISR. Evidently, results based on interviews and documentation showed that these, ideally, can lead to an effective IS alignment, but however, seen to be lacking at KISR. This thesis writer was prompted to design a revised framework, incorporating all the factors in the three domains as stipulated in Pettigrew's theory. Apparently, in the course of the research, emergent factors surfaced, and these factors proved to have enlightened this thesis writer to expand on Pettigrew's theory by devising a revised framework designed to fit the case institution. These emergent factors would not only effect IS alignment, but more importantly, would provide added value ensuring for the organisation a sustainable and long-term IS alignment.

These factors include the creation of a unit called SMART, where members of the organisation are urged to conceive and look forward to possible opportunities and

creative ideas towards an effective and efficient strategic alignment. It was found that manuals that contain policies, procedures, rules, organisational roles, and regulations lack not only clarity, but also transparency which leave members in confusion and in ignorance of existing rules and regulations. Hence, PRRP manuals are in order, preciseness in job descriptions and business continuity are called for to achieve the much desired IS alignment in the organisation.

Alongside with the recommended road map, evidently, the factors patterned after Pettigrew's (1990) original model and the aforementioned new emergent factors, the designed and revised framework is recommended to enable KISR as an SR&D organisation, and herein posed as the Lead among the SR&Ds, to achieve a stronger linkage, cooperation, coordination, and communication among the business and research networks in the organisation. Consequently, this revised framework is to become a powerful working model, feasible and practicable, not only for KISR, but even so for other consulting SR&D institutions.

Therefore, from a holistic perspective, all information system capabilities can be put to good use and practice; all information system alignment challenges and critical success factors can be met; all information system alignment competencies may not only be improved, enhanced, and developed, but more importantly, sustained and branched out to benefit KISR and other SR&D institutions. Alongside, there will exist bridging and filling in of all information system gaps, thus, effecting better understanding of organisational goals.

Ideally, the revised framework may be a useful contribution to bridging theory with practice and true to the classic claim of Walsham (1993), this revised framework may prove to be a dynamic link between action and context, between theory and practice.

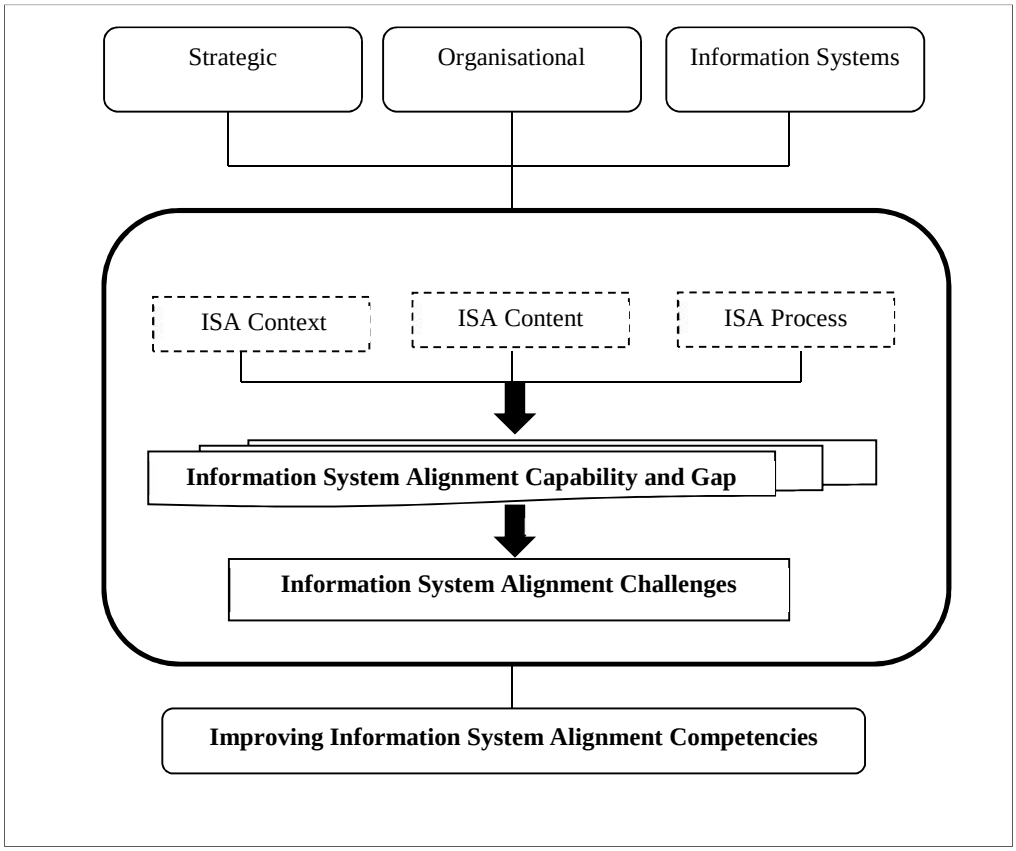

Figure 7-5: Revised Framework

The revised framework was developed based on the initial framework and the contextual theory of Pettigrew (1988) that embodies 'context', 'process', and 'content'. In the light of the aforementioned reviews, the proposed revised framework has been developed and structured as shown in Figure 7-5.

Furthermore, the critical success factors (CSF) of IS alignment have been updated as shown in the CSF Tree (Figure 7-6). The four emergent CSFs illustrated in the grey shapes.

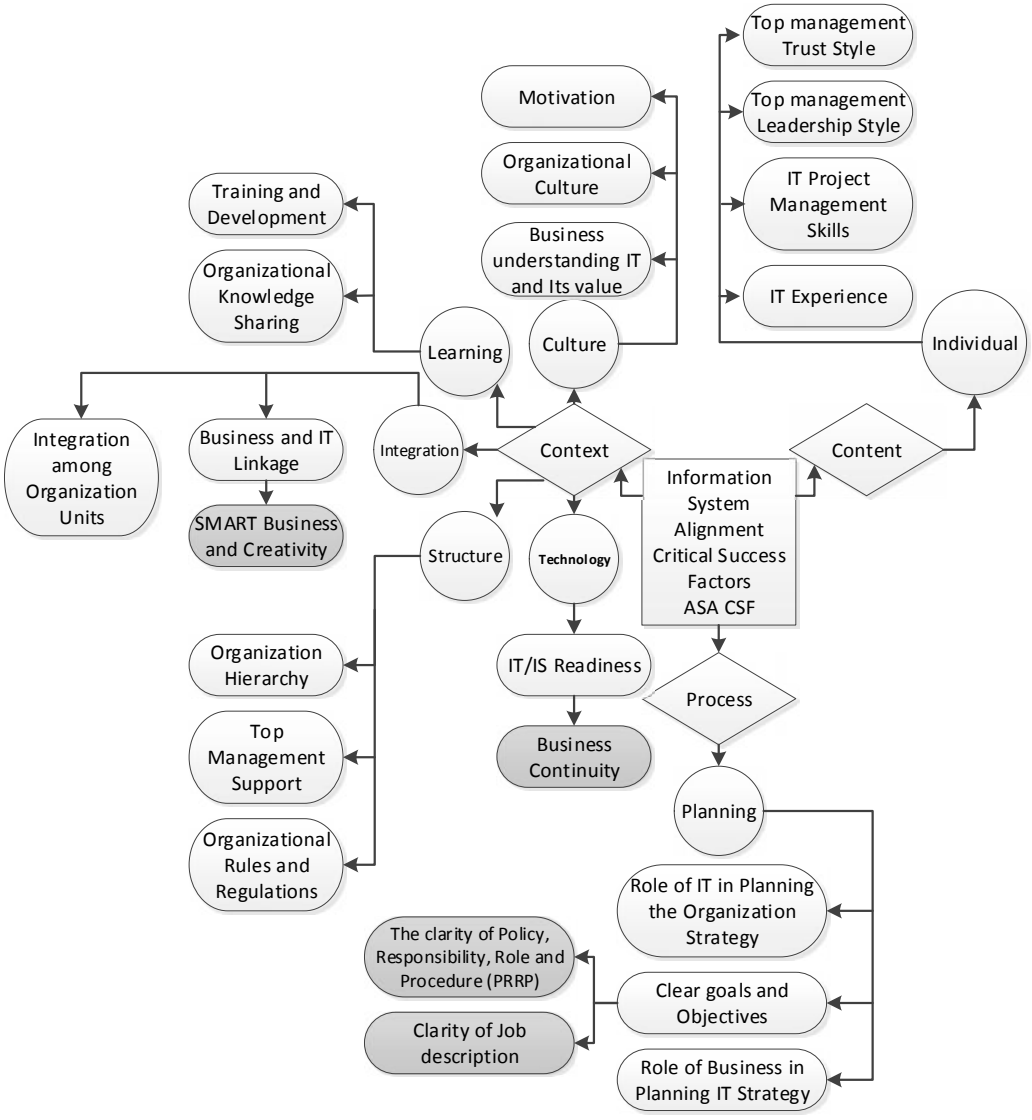

Figure 7-6: The Updated IS Alignment Critical Success Factors

7.7 Proposed Road Map for Achieving IS Alignment

One of the shortcomings that was noted in previous relevant studies in the literature was the lack of practical solutions for achieving IS alignment among SR&D organisations, as presented in Chapter 2. A clear gap is marked between theory and practice, and therefore, the purpose of this subsection is to develop a practical road map that will guide the SR&D entities to successfully achieve IS alignment in the light of the findings of this research. Simply put, the proposed road map is to fill the gap between theory and practice.

The proposed road map shown in Figure 7-7 has been designed in the light of the study findings and based on the outcomes of the whole research. This road map could help SR&D organisations of similar context to achieve IS alignment. It may serve as a guide to these SR&D organisations to accelerate the IS alignment process.

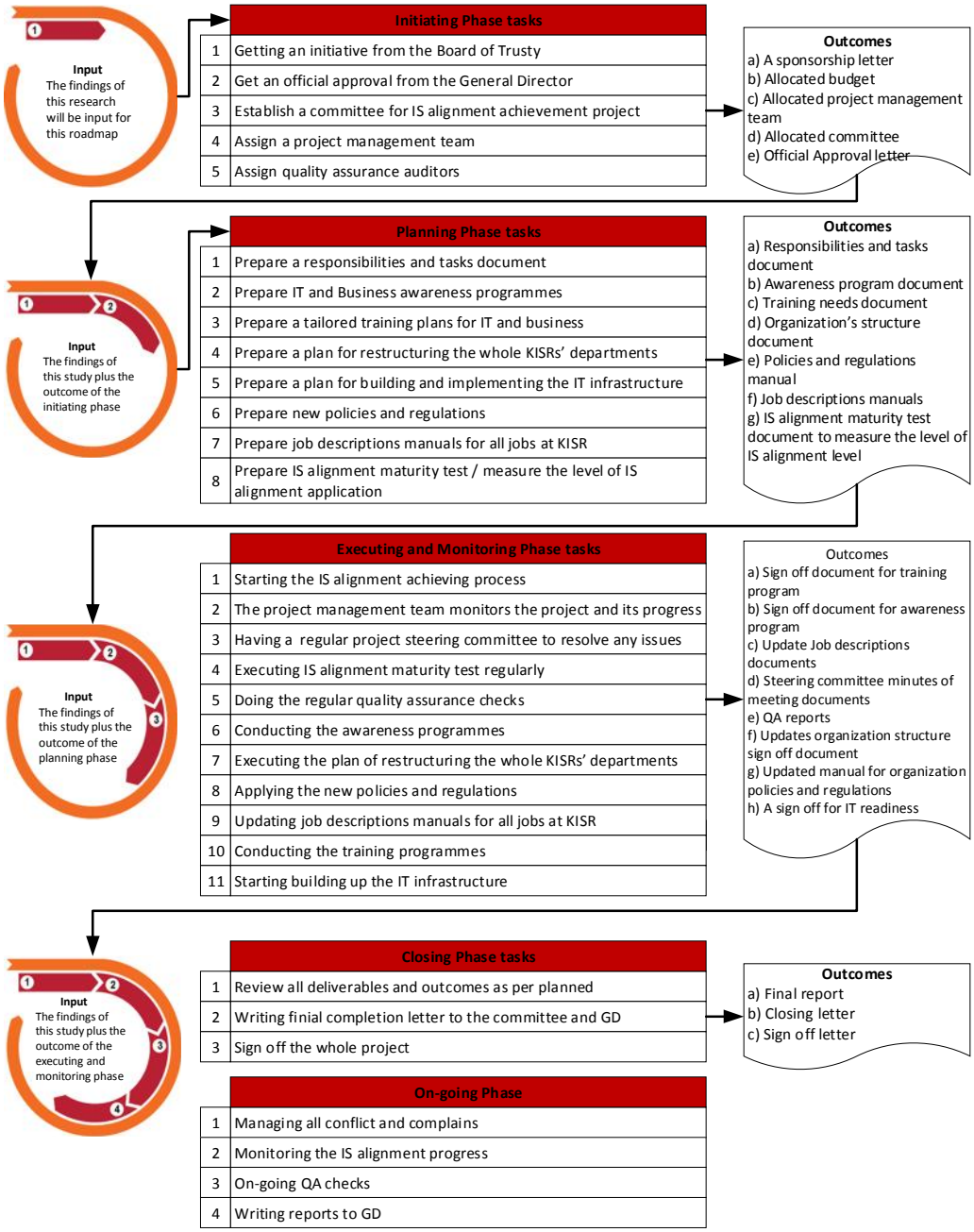

Figure 7-7: The Proposed Road Map for Achieving IS Alignment

This designed road map has been prepared in the light of the analysis results of the completed study. The road map covers 5 stages or phases, namely, Initiating, Planning, Executing and Monitoring, Closing, and the last phase in an ongoing process. At both sides are a gamut of inputs and outcomes from the first phase to the next and on to the last stage in the process.

In this road map, achieving IS alignment in SR&D in organisations at the initiating phase would need the initiative from the ruling authority such as the Board of Trustees. The General Director (GD) then officially approves and establishes a committee for IS alignment achievement project. The committee has to assign a project management team as well as a quality assurance auditor. The outcomes of this phase are the project approval, sponsorship letter, allocate committee, project team, and budget. The projected time frame is sufficient to complete the project implementation.

The Planning phase is materialised through a list of documents from tasks and responsibilities of every project member to awareness program, training needs, organisation structure, policies and regulations, and job descriptions. Once all these requirements are completed, preparation of IS alignment maturity test or application is the final stage of the planning phase.

The Executing and Monitoring phase starts the IS alignment process. It is at this stage that monitoring is done by the project team; regular meetings are conducted to see to the challenges encountered; tests, quality checks and assurance are administered; submission of reports is done regularly by the team; employees and technical staff are

trained, job descriptions are developed and updated, as well as policies and regulations manuals, if required.

The Closing phase is that stage where all deliverables are reviewed to ensure that they are in accord, as per planned.

The Post-Implementation phase is an ongoing process of managing conflicts, complaints, as well as monitoring the IS alignment progress and ongoing quality assurance checks. This phase will end by writing a report to GD.

This road map can be employed as a working model or framework and would be of benefit to SR&D organisations in their effective and efficient transfer of research outputs to intended beneficiaries at the least cost possible, but with the best and sustained returns in the aspect of growth and productivity, and even commercialisation and income generation at a later phase.

This road map as a guide, could lead to achieve ISA in the SR&D organizations. Moreover, the road map helps to allow all records, information, research outputs, if properly synchronised in one efficient and effective information technology system can easily be retrievable and accessed from any department or unit within the organisation.

7.8 Inferences from the Proposed Road Map Relative to Critical Success and Emergent Factors for IS Alignment

When all parts in the organisation pool together for a common goal, from the three domains, namely, context, content, and process, IS alignment is realisable in the technology transfer process.

Clearly, in context, the upper management, senior managers, and executive support are effective drivers to achieving IS alignment, implying that IT is better understood by this upper hierarchy within the business unit. In the proposed road map, distinctly, participation is already discernible from the initiating phase where the ruling authority in an SR&D organisation is represented by the top management, the leadership, the CEOs represented by the senior managers, and a team of consultants with their corresponding assigned tasks. At both ends of the spectrum would show lead government agencies seeing to the supervisory and financial aspects and to serve as clients in the process. This is significant in that, it tries to bridge the gap in whatever is lacking in the internal organisational environment with the external environment providing support and funding. Knowledge sharing here is important, indicative of the presence of consultants in coordination and brainstorming with selected pools of experts in their specialised scientific fields.

Organisational hierarchy becomes well-defined in the designation of roles and responsibilities even in the planning phase where all sectors should be well-

represented in the project team while instituting regulations, formulating business requirements, project needs, scope, budget, among others.

From the content domain, more notable is the skills training in the road map which is an important driver in successful technology transfer. When members of the organisation are properly trained and honed in their respective areas or discipline, the outcome would be successful knowledge sharing which can be transformed into creative ideas that would prove useful to the organisation as a whole.

As well, the road map shows a decentralised leadership style, as power is not controlled by the top management, but is delegated to teams and groups, exercising functions and roles, individually and collectively by the organisational members.

Process-wise, the trained technical staff, which, as implied in the road map, could be those belonging to the IT group who may be tasked with the technical aspects of the project, facilities like hardware, softwares, information system deliverables, and communication services. These are important tools to strategic planning, the IS in coordination with the business units, who are responsible for the quality control and assurance of services and deliverables in the technology transfer process for the satisfaction of the end users which include both the organisational members and outside, such as other SR&D organisations.

The emergent factors that surfaced using the findings of the current study, as inferred from the proposed road map are manifested in an ongoing process of monitoring and evaluation of organizational outputs and deliverables through tests, to include

operation, maintenance, and resolution of conflicts and complaints. All these are characteristic of the need to improve, enhance, make clear all roles, regulations, procedures, responsibilities, and promote the capability of the business, so that delivery of services is satisfactory and sustained for the long-term. The effective and efficient management systems will support to achieve a sustained successful integration between IS and business for an effective and efficient technology transfer process and operation within the SR&D organisation.

Chapter 8: Summary and Conclusion

8.1 Introduction

This chapter highlights the conclusions to this study and summarises how this research tried to address and fulfill the objectives of this study. In addition, it presents a discussion of the research contributions that the study has achieved on the subject of IS alignment in SR&D organisations. Finally, it highlights the limitations of this study and proposes future research recommendations.

8.2 Addressing the Questions of this Study

In order to address the research questions that are identified and stated in Chapter 1, each question is dealt with in turn. The first research question asked: "What are the key determinants of success for aligning IS strategy with organisational strategy?". This question is addressed by presenting a detailed and critical literature review as explained and discussed in Chapters 2 and 3.

Chapter 2 reviewed the IS alignment literature that intended to prove the possible benefits which could arise to all type of organisations in adopting IS alignment. In addition, the chapter identified and explained twenty- two determinants as potential factors that may affect achieving IS alignment.

Chapter 3 provided the conceptual framework for investigating IS alignment within an organisation. Furthermore, all CSFs identified under three main dimensions. Both chapters identified the key determinants of success for aligning IS strategy with organisational strategy.

The second research question asked: "How can SR&D organisations deeply understand of how to achieve IS and organisational alignment?" This question is addressed by conducting a single case study in KISR based in Kuwait. Chapter 2 section 5.2 provided an overview about IS alignment in developing countries. Moreover, chapter 5 discussed KISR as a scientific research and development organisation. KISR organisational strategies as well as IT strategies have been reviewed. This involved breaking the organisation down into 4 distinct centres of research but inter-related departments viewed as sub-case studies. An investigative conceptual framework was designed to help in understanding the problem and in creating a base of knowledge to conduct the research study and inquiry.

The third question asked: "How can SR&D organisations ensure the achievement of sustainable IS and organisational alignment?" This question is addressed by proposing a revised framework and a practical road map. It is a step by step presentation of tasks that could eventually lead to achieving IS alignment in SR&D organisations as explained in Chapter 7.

8.3 Main Findings

8.3.1 Research Objective 1

To identify and categorise the key determinants of success that would allow SR&D organisations to align IS strategy with organisational strategy

Critical success factors were identified as key determinants of a successful IS alignment with organisational strategy. These critical factors were categorised from the perspective of three domains, namely, context, content, and process, initially based on Pettigrew's contextual framework and expanded to incorporate the CSFs and factors identified from seminal research in the literature. Findings on these critical success factors showed to have been significant in positively or negatively affecting the achieving of IS alignment at KISR, the case study organisation.

From the context domain, the key determinants constituted the following, illustrating their effects on the IS alignment at KISR:

- Business understanding IT and its Value. Senior managers and researchers had better understanding of IT and its values because of their high level education, involvement, and awareness of the goals of IT and business. They are the key drivers to achieving strategic plan objectives.

- Organisational culture. KISR organisation has a distinct culture different from other Kuwaiti organisations. As revealed, KISR culture was not a good fit to achieving IS alignment. As highlighted by many authors, culture is a potential

barrier to IS alignment if not given serious consideration by the upper management.

- Motivation. Lack of motivation was seen evident in the findings. Results showed a negative effect in the application and achievement of IS alignment.

- Organisational Knowledge Sharing. The knowledge sharing factor was shown to be less important but had a significant effect on achieving IS alignment. Findings pointed to the importance of a shared pool of knowledge between centres, departments, and the staff, as it could lead to better working environment and facility in achieving IS alignment.

- Training and Staff Development. A majority of the respondents signified that training and staff development have a significant and direct effect on achieving IS alignment. Skills and expertise if honed and enhanced, could result in better work performance. A well-trained staff, particularly in the IT aspect, can delegate the responsibilities and functions, and therefore, can be working coordinatively and cooperatively with the other members of the organisations. Training staff in IT can help offset the lack of experienced IT staff already employed in the organisation.

- Linkage between Business and IT. There was poor understanding on the importance of this linkage between business and IT. Only the senior managers were found to have understood the importance of this factor.

- Integration among Organisational Units. Disintegration was evident among units in the organisation. No support from the current hierarchy in the organisation was evident.

- Organisational Hierarchy. This was found to have a negative effect on IS alignment. Because consultants were given the liberty to revamp the organisational structure, apparently, being centralised in nature, the new hierarchy showed to lack flexibility and productivity.

- Top Management Support. At KISR, support was seen to be prejudicial; some got much support; others got less. This support can be in the aspects of funding, acceptance, and recognition of proposals, ideas, and capability of staff.

- Organisational Rules and Regulations. Transparency, accessibility, and clarity of rules at KISR were found to be lacking, to some extent, absent, both at an individual and organisational level.

- IT/IS Readiness. This was found to have significant and positive effect on IS alignment. Knowing that there was the absence of IS infrastructures, respondents suggested the preparation of IT infrastructures in one centralised system to handle all business needs and should be accessible to all staff over all departments.

From the content domain, the key drivers to a successful IS alignment comprise the following:

- Skills and Experience in IT. Skilled IT people are valuable, but difficult to find in the market. Hiring experienced and highly qualified IT people are hard to find, and this has been a perennial problem at KISR. Besides, having a fixed salary scale and a temporary status for non-Kuwaiti hires poses a challenge to hiring experienced and qualified IT personal, and KISR does not allow exceptions by offering a rewarding and gratifying salary package.

- IT Project Management Skills. IT project managers were found to have been working in small units and therefore, not given the opportunity to manage the projects at KISR, as well as to develop and apply policies, standards, and procedures as a guide. Other than the clearly evident weak leadership management in the office, there also is the lack of qualified knowledge to deliver the expected services as demanded by the responsibilities and functions of the office.

- Top Management Leadership Style. Top managers were found to be so self-contained and self-confined to their tasks. They do not delegate responsibilities to qualified staff. Some were found to be resistant to taking risks. In effect, roles are centralised in the leadership.

- Top Management Trust Style. These two— leadership and trust styles are interlinking factors. If the leadership has a clear-cut delegation of tasks to

qualified staff, trust would also be existent; and vice-versa. As reported, trust is not clearly marked, and the IT group should resolve to convince the top management that they have the ability and the capability to help improve the business units in the organisation.

From the process domain, the following concerns were taken into account and are discussed based on the study results.

- IT Role in Planning the Organisational Strategy. IT was reported to have participated in strategic planning, and it showed that its involvement posed a significant effect in the comprehensive planning covering all aspects of IT and business alignment plans.

- Clarity in Goals and Objectives. This factor was found to have a significant effect on IS alignment. The current strategic plan at KISR had clear goals and objectives. Implementation was the problem.

- Business Role in Planning the Organisational Strategy. This showed effective participation of the business departments in the strategic planning process, indicating a clear understanding of the role of their departments in a positive IS alignment process.

In addition to the enumerated critical success factors, there emerged other factors in the course of analysis, which could be affecting IS alignment in the organisation.

- SMART Business and Creativity. This is one unit at KISR that is tasked with creating innovative concepts and ideas. This, according to senior managers can help balance needs with opportunities via proposing doable and feasible ideas for execution by designated departments.

- Clarity in Policy, Responsibility, Role, and Procedure (PRRP). No approved PRRP manuals were found to exist at KISR, and the absence of a manual has caused ambiguity in matters relative to PRRP. Evidently, having clear well-defined PRRP via a manual could have positive influence on IS alignment.

- Clear Job Description. Job descriptions were found to be outdated and a mismatch from what is actually functioned by a staff and what is written in paper. Not only is the work performance affected but also the morale of the staff. This was one factor found to have significant and positive effect on successful IS alignment.

- Business Continuity. It was found that the organisation as a whole revealed an understanding of the significance of linking IT strategy with organisational strategy. The organisation is required to continue the delivery of its services and products, at best, on a satisfactory level. As agreed, the organisation has to be prepared in the aspects of its functions, finances, and operations for a successful communication between business and IT/IS.

8.3.2 Research Objective 2

To explore and understand the process of IS and organisational alignment using a case study organisation

Brief Description of KISR and its Centres

KISR is a multidisciplinary scientific institute that was chosen as the case organisation as an archetype representation of all other SR&D organisations in Kuwait. Briefly, KISR is tasked to undertake research, scientific, and technological consultation for both the government and private institutions in Kuwait, the Gulf, and the international scientific community.

To meet the Institute's mission and vision, it has adopted strategic planning, programming its research via strategic plans evolving through the years from 1976 to its Transformation or Re-engineering Phase envisioned from 2010 to 2015.

Evidently, the current strategic plan only looked good in principle, but not implemented as expected in reality. Seemingly, the strategy at KISR is not a clear concept due to the volatility in the work environment brought about by internal and external forces that often leave both managers and staff in mayhem and confusion.

Critical observations have come into view relative to the existing organisational culture at KISR that is highly affecting its organisational behaviour, which has not been given due regard by the upper management.

Strengthening KISR's Information and Communications Technology Infrastructure

The IT strategic plan centers on ensuring access to reports across all units at KISR, improving the direct automation of finance processes, and providing direct installation of new communications systems such as telephone and wifi access in the whole of Shuwaikh campus. All these focus areas are supposed to be embodied in the strategic plans to be shaped by the challenges faced by KISR which include government agencies, Board of trustees approval, loss of experienced staff and lack of full integration between processes due to the structural transformation, lack of automation, cooperation from government agencies, absence of interaction both within KISR and outside, and lack of updated computers and experienced and qualified IT people.

In effect, there is the need for reliable and high capacity information communications systems in the organisation. Evidently, KISR has to upgrade its information and communications technology (ICT) infrastructure and functionality if indeed, IS alignment is desired by KISR.

8.3.3 Research Objective 3

To develop an IS alignment framework that can be applied to KISR and other SR&D organisations

The IS alignment framework has considered the factors relative to the three domains, namely, content, context, and process, as designed by Pettigrew (1988) in his theory.

The proposed framework designed in this study took into consideration the key determinants of success, as well as the factors that emerged during the analysis of results from interview respondents in KISR. The framework is designed to understand IS alignment competencies in the organisation based on the logic that strategy, organisational, and IS domains have alignment implications. The framework identifies the contributions of senior managers, CEOs, CIOs, and the planning and support teams relative to integration activities.

To identify the gaps and capabilities of IS alignment, the framework serves as a guide to discover, examine, and investigate the knowledge, experience, and skills of the organisational members.

In a similar vein, the framework is designed to link IS alignment capabilities and gaps with the critical success, as well as the emergent factors as identified and discussed in Chapter 7 and in the discussion of research objective 1. These critical success factors have helped draw a clear map of the alignment challenges in the organisation. This framework is intended to be a working model as well, for other SR&D organisations in the country and the Gulf region.

8.3.4 Research Objective 4

To develop an IS alignment road map for use by KISR and other SR&D organisations

The road map is explained and discussed in detail in Chapter 7. The developed road map highlights the solution to bridging the gap between theory and practice, i.e., to serve as a guide in successfully achieving IS alignment in the light of the findings of this study.

When all parts in the organisation pool together for a common goal, from the identified three domains, namely, context, content, and process, IS alignment is realisable in the technology transfer process.

This road map would be of benefit to SR&D organisations in their effective and efficient transfer of research outputs to intended beneficiaries at the least cost possible, but with the best and sustained returns in the aspect of growth and productivity and later in the commercialisation of research outputs.

8.3.5 Research Objective 5

To provide recommendations toward improving and executing the IS alignment road map in SR&D organisations

Recommendations are presented on the basis of the designed road map's implications to KISR and other SR&D organisations in Kuwait and in the Gulf region.

Policy Recommendations

In view of the observed implications for Kuwait, some policy recommendations are put forward, as follows:

- Policy makers and those members of the Parliament are urged to formulate clear-cut and well-defined policies and regulations relative to the information networks of the country, especially for the IT sector, both private and ministries, particularly, in the Ministry of Communications. Given the needed infrastructures, the training, human and quantifiable resources, the rewards and positive upshots both to the State and the people will be wide-ranging.

- Kuwait is rich in its oil and energy resources. The country can capitalise on this strength with the government and other private agencies, allocating research grants for innovation in research ventures in petroleum and energy resource technology, along with strengthening technology transfer using IT infrastructures. The revenue and returns of investment will be extensive not only for the country, but also for the region, which are oil- and energy-rich countries, as well.

- The Kuwait Government has a strong leverage, because it is supportive of its citizens in the form of subsidies; hence, this kind of influence can be used to encourage or to an extent, obligate its citizens to be cooperative of the

Government's undertakings, in all of the country's activities. The Government can probably organise highly skilled IT groups to provide training which can be made obligatory, as well as for them to develop software tools and instruments. Awareness campaigns can also be launched to encourage in every individual to be self-motivated and have the self-initiative to be a leader in the work force, to be receptive to every training course, not because he is forced to attend, but because he wants to do it for the exigency of the country and the agency he serves. The main implication for that is to increase the probability of integrating IS with all organisations strategy.

- From KISR's end, all success factors considered, the Institute should grow its business; solve real issues; clarify its strategy; develop leaders, not just from the senior line, but also from those young breeds who are willing to change and effect change to others; and get the best, provide the best for its employees.

8.4 Research Contribution

Apparently, there is still a dearth of information or body of knowledge as to the implementation of a successful integration between IS and organisational strategy, which we call the IS alignment problem, particularly in the public and government sectors. Moreover, no study has yet identified the requirements for achieving, maintaining, and diagnosing challenges that hinder sustainable alignment. Hence, this

research is an attempt at achieving IS alignment in SR&D organisations, as well as identifying and categorising critical success factors of IS alignment as explained in Chapter 7.

This research is considered to be one of the very few studies conducted in such a context and environment, especially within an Arabic culture as embodied in Kuwait. The outcomes of this study intend to contribute and provide enriched knowledge in the field of IS alignment. Specific contributions are summarised as follows:

- A critical and comprehensive survey of literature has been done which led to the identification of factors that could affect the IS alignment. This literature survey could extend existing knowledge in this field. As a result, 22 factors were selected to be included and investigated in this study.

- The lack of a theoretical framework which can be applied to understand the determinants that influence understanding and achieving IS alignment is identified in Chapter 2, and to fill this gap, a conceptual framework is presented in Chapter 3 for a better insight of the IS alignment challenges. This framework presents the theoretical basis of this research. Chapter 4 presented the select methodology, methods, tools and the data analysis technique to achieve the research objectives. As a result, and in the light of this framework, the interview questions have been prepared. A holistic picture of the SR&D organisation presented in chapter 5. Furthermore, the role of IT in SR&D discussed as well as the strategic plan and organisational structure. The

proposed framework is analysed and discussed in Chapter 6. Finally, based on the case study findings, a revised framework is developed and proposed in Chapter 7.

- The revised framework would enhance the understanding of the nature of the problem and its surroundings as explained in Chapter 7. The framework has put forward factors that may affect IS alignment into three dimensions: context, content, and process. The analysis of the results also has revealed new emergent factors as discussed in Chapter 7. A practical road map was developed in this study to guide and help SR&D organisations for achieving IS alignment effectively and efficiently, as presented in Chapter 7. This key contribution is supposed to bridge the gap between theory and practice, which can pose as a practical solution needed by SR&D organisations. The proposed practical road map will help KISR and other SR&D organisations to achieve IS alignment successfully.

- Moreover, findings of this study have practical implications, as the proposed road map could be applied in the real world, in the Arab region, and in the global arena.

- Findings of this research will prove beneficial not only to Kuwait, but more importantly to the GCCs. The GCCs are of similar nature with Kuwait in matters of culture, management style, rules, regulations, and policies.

8.5 Conclusions

The research was aimed at determining whether there exists effective alignment between IS and organisational strategy at an SR&D organisation, the case of KISR in Kuwait. Employing a single exploratory case study method, the study was aimed at identifying the key success factors contributing to this alignment; and to explore, document, and analyse alignment between IS and organisational strategy based on the conducted interviews with the sampled interviewees from the IS group, Planning and Support group, and the Managerial component of the case studied; further, to be able to design a road map that can be used as an IS alignment working model by other SR&D organisations.

In the process of analysis, a brief background of Kuwait, its history and its information network are given in the discussion, then, followed by an investigation using three sources of data, the document analysis, participant observation, and responses from the sampled interviewees. The rationale for this type of presentation is to relate whatever responses and observations have been generated from the samples to the research framework as applied in this research, referred to as the contextualism approach, i.e., the contextual forces may be considered from two settings, namely, the external and internal environments. Moreover in that, all forces or elements within these two milieus should be taken from the standpoint that the internal setting is linked and is influenced by the external environment. In parallel, there also is an interplay of all forces within the organisation. Clearly, if organisational transformation is

desired, a holistic perspective of these factors and their interaction, integration, and interconnections should be considered.

On the bases of the results of the study, conclusions have been drawn from the Kuwait experience and from an assessment of the organisation.

- Lack of transparency. Exposure and access to information are limited and restrained, which are likely to have stemmed from political and cultural underpinnings. This disproves Aladwani's (2014) cultural scheme relative to Kuwait being less on individualism, but otherwise consistent with the high power distance aspect. People are not at liberty to be exposed to the needed information and have access, because people of authority have a strong sense of propriety---"*this is mine and therefore, you cannot take it*" to quote one interviewee. If this kind of mentality cannot be rid of, then sharing and transparency within the organisation would remain to be a remote possibility. As regards high power distance, the gap, inconsistency, and the inequity in the system are likely to level up, because of the 'powers that be' and those 'self-anointed powers', by virtue of their being positioned under designated authorities, or the same 'powers that be' in the organisation, who apparently distance themselves from the lower and bottom end of the hierarchy.

- Absence of clear-cut procedures and policies. Lines in authority are not well-defined; people are not hired and positioned as per their qualifications; highly qualified staff are not given proportionate remuneration and benefits, to

include, not being rightfully appointed and designated to higher positions. The impact is far-reaching, and as already been proven, resulted to not being able to attract high-caliber professionals with the experience, expertise, and to be particular, scientific and technical backgrounds. Moreover, a great number of good and efficient people are observed to be leaving the organisation to seek greener pastures and wider horizons.

- Lack of a well-developed IT strategy and IT best practices. This stems from IT infrastructures and other needs not given priority and a financial subsidy by the management.

- Lack of a strong interlinkage between organisational strategy and the IS plan. Integration of the IS and the organisation's strategic plan is a fundamental attribute in the formation of an IT-enabled competitive advantage. Essentially, as claimed by Botten and McManus (1998), the long-term strategy is developed by considering current and possible uses of IT in order to accomplish a degree of strategic validity.

- Lack of involvement from the lower hierarchy in the organisation. This limits participation of the lower end of the spectrum, who constitute the people who do the leg work, but whose involvement and contribution are not given recognition and appreciation.

- Centralised organisational structure. The decision making process and leadership style are concentrated in the upper management, and hardly are the

middle management and those within the departments concerned given the opportunities to participate in the decision making process. Delegation of tasks is almost absent. Given this lacking attribute, the organisation has to be flexible with the demands and changes of the times. Apparently, there may be a need for a decentralized distribution of roles and responsibilities, as well as a two-way flow in communication and dissemination of information.

- Two-way communication is not encouraged, thus, inhibiting the airing of feedback from the lower chain of command, which could have been useful not only to the successful delivery of services, but also in the effective and time-saving performance of functions and roles.

- Training is an important component of human resource towards effective performance of functions, particular in information systems and information and communications technology, but more so fundamental than the training aspect, is the hiring of highly qualified staff in all job positions, and especially in the technical and information systems' posts.

- Lack of a smooth delegation of roles and responsibilities in all departments, particular in the administrative and support divisions. Proper delegation of responsibilities is deemed necessary, such that when one staff in charge is not available, absent, or on leave, anyone among the staff in the same office should be able to handle and assist in accessing the necessary information.

- Radical structural transformation**.** Evidently, the implementation of the changes in the organisational structure may be said to be a radical and a revolutionary move of the management, apparently neglecting the repercussions as a result of the re-engineering of the Institute. People are displaced, misplaced, and disoriented, in terms of their roles and responsibilities, and as to where in the chain of command they should aptly belong. Nonetheless, in all fairness and not to discredit the good intention of the management, it has to be known that this has caused disintegration and disharmony, not only in the parts, but in the sum of all its parts in the organisation. Alterations in the structure may not be a reliable solution as Morton (1991) posited.

- Critical success factors have been presented in the discussion such as shared understanding and knowledge between groups in the organisation and its IT as to the strategic nature of its IT, governance mechanisms, and strategic direction (Sabherwal and Chan, 2001). The literature is packed with frameworks on strategic alignment which have been proposed, argued, and refuted in time. Accordingly, Benbya and Mckelvy (2006) along with Tallon and Pinsonneult (2011) claimed that organisations can be a prey to what is referred to as 'rigidity trap where tight or dogged links between IT and business can cause a gap or obstruct an organisation's ability to respond promptly to environmental change. Markedly, what is important is getting the right level and type of alignment. A more exhaustive coordination and shared understanding between

and among the concerned strategic planners, with full patronage of the top leadership are deemed appropriate and fitting to get the right level and type of alignment for the Institute.

As discussed, all of KISR's scientific centres have a well-projected presentation of their visions and clearly defined objectives and goals aligned with the country's development plan, in conjunction with the delineated tasks of the departments within a specific centre in aspects of procedure. If and when research results are applied and retrieved by intended beneficiaries or end users, only then could be said that strategic alignment has truly been achieved. It is worth noting that each Centre has a TDS department which is led by a Director who sees to strategic technology planning, consulting, software validation, and business support functions. The department also assists in strategy formulation and handles operational responsibility. This technology development service element in the organisation of every Centre is indicative of the coordination that seems to have been, as yet minimal. As per Luftman's (2000) assessment:

"*the accomplishment of alignment is an evolutionary process,*
for which there is the need for good working relation
and cooperation, adequate prioritisation, good support
from top management, good leadership, a comprehensive
understanding of the business and technical conditions,
trust, and effective communication" (p.2).

8.6 Implications and Limitations

8.6.1 Implications for Kuwait as a Developing Country

Given the significance that Kuwait is a small country, with a strong economy, a sound information network base with all the facilities provided and reforming IS centres, as well as a solid private sector contribution, Kuwait may be said to have a greater edge over other developing countries in matters of IT/IS alignment with its business activities and agencies. Consequently, it would be easier to forge a good relationship between the different parts of a company or agency, since being small and a reasonably sized society, it has small-sized corporations.

Notwithstanding all these advantages, certain implications may be derived in matters of challenges that have yet to be overcome in order for a developing country, like Kuwait to effectively implement the IT policy. Conclusively, these factors are the following:

- The absence of theoretical or empirical research in the field of IS/IT has led to a state where there is insufficient data available on the current status of the usefulness of the existing IT program, and policy managers have no idea about the areas which have to be dealt with on a priority basis.
- Appropriate rules and regulations have to be set up for the IT sector, and government agencies need to be launched to make sure that the IT plan is implemented in accordance with the objectives of the State.

- The IT infrastructure in the country needs to be further developed, and the usage of IT needs to be expanded to the newly set-up fields such as fixed line and fibre optics communications systems. Security needs to be guaranteed, and relevant laws need to be framed. The deficit of skills has to be met by training people in the field of IT so that Kuwait development plan can be achieved.
- Finally, the Government has not as yet been in full support, particular in financial initiatives and grants from strategy planning to technology dissemination, utilisation, and application for sustainable alignment of all possible communications and information technology networks.
- More importantly, because Kuwait has a strong power-driven culture with only the elite and the more illustrious members of the society are given the authority in decision making, a very important move is for the Government to initiate involvement of the lower and less dominant classes, as they are in most need of all these information services.
- It may be implied that Kuwait, pertinent to its culture is apparently weak when it comes to individualism. This may have been a result of the Government, being almost altruistic in nature, because of the support and subsidies provided to the nationals in all aspects of their lives from the marginal to the most fundamental, such that a departure from this natural course would cause a twist in their natural order of things. This characteristic is carried through to the individual. Hence, the change should start from the individual himself. Each

individual in the hierarchy should first start putting his own house in order to be able to effect a change effectively to benefit a greater whole.

8.6.2 Implications for Kuwait Institute for Scientific Research: Strategic Planning

- From a general perspective, Kuwait does not have a comprehensive vision of development for the next ten years. Hence, KISR as a scientific institute has always been challenged and has been finding it problematic to come up with a precise definition and identification of its research thrusts and vision to align them with the country's vision of development. If the Institute aims to have the plan successful in principle and application, then, it should be able to design its strategic plan in line with the country and its people's needs and demands. The government's priorities, policies, and programmes for all its sectors are not well-defined.

- Low budget allocation and financial support for research and development from the national treasury, which do not even fall within the 3% of the GDP apportionment.

- R&D and even technology transfer are not given that much concern and priority by the government of Kuwait, to include acquiring foreign consultancy, with extensive experience in diversified cultures and wide-ranging knowledge in the field of applied scientific research and technology.

- A definite and distinct scientific and technological set of policies is lacking, if not absent.

- The needed infrastructure to support the role of scientific research in all development fields is also inadequate, if not lacking.

- There are no proper mechanisms to link and bridge the gap between scientific research activities and technology transfer in all aspects of national development.

Evidently, for organisations wanting to improve their IT, identifying these factors has great implications, more so, to be given greater importance if organisations so aspire to use IT successfully in order to support achievement of their objectives or to use IT to gain sustainable competitive edge over their counterparts. If all these challenges are faced successfully, based on cost-effectiveness, quality, and time parameters, it would follow that the organisation would be more effective and efficient, than if it had only one or two of these factors present.

8.6.3 Research Limitation

This study has two particular limitations. The first was that the interviews were conducted and recorded in Arabic, and after that had been translated into English, this led to some misleading information and lost the sense of the sentences. The second limitation is the need for the proposed practical road map to be tested in the real world

at SR&D organisations. However, this step takes time to be implemented and would be considered as a future work.

8.7. Recommendations for Future Research

This study, admittedly, has its limitations; hence, this researcher deemed it suitable to recommend further research on the following:

- This researcher has identified key determinants that can influence the alignment of IT with organisational strategy. Identification of these determinants can provide a baseline or a benchmark for other researchers to further investigate the concept of IT alignment with business strategy of the organisation, be it within the SR&D organisation, particularly if technology transfer is geared towards sustainable income generation.

- Considering that this research has its limitation in the number of sampled interviewees, further research could use a bigger percentage of the organisation's population to include the middle management level, to be able to generate a wide-ranging or more exhaustive responses to the survey questions. A sequel to this research may be called for.

- It is also apparent in the results of this study that management is not supportive in terms of budget allocation to the IT component in the Institute. One area of research could be an investigation if increased budget allocation for IT

would have correlation with increased profit generation of the organisation, be it in financial investment or in technology generation and transfer.

- This study can be extended to using other case studies that may not be within the SR&D domain, if only to have a different perspective of IT alignment in the corporate world. A different set of case studies may be an interesting field to delve into. While this study has initiated a road map to be used as a model for SR&D organisations, an investigation of case studies within the corporate world would be an attractive prospect for research.

- In the context of integrated IS, an investigation of the political variables and how they relate to the establishment of management information systems in organisations with more complicated structures with different units and sub-units, as well as determining how these political variables affect the organisational performance may be conducted.

- Notwithstanding, much has yet to be desired in matters of IS alignment in both the business and organisation sectors. More in-depth studies are called for, to examine and analyse various aspects in the organisation, not to mention, designing other strategic alignment models that could serve as a better fit to the evolving nature of business, alongside with changes and challenges attached to every phase of its growth and progress, not to mention the upsurge of changes in the external environment.

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Appendix A: Interview Question List (Arabic Version)

مجل مجموعة الأسئلة	الأسئلة	الهدف منها
الأسئلة الاستراتيجية وتوجه للجميع (المدراء العلميين، العاملين في نظم المعلومات، والإداريين)	هل الخطة الاستراتيجية المتعلقة في مجل عملك (البحث العلمي، نظم المعلومات، الخدمات الإدارية) واضحة؟ هل الأهداف تم صياغتها بشكل واضح؟	لاستكشاف مستوى الفهم للخطة الاستراتيجية.
	هل شاركت في عمليات التخطيط الاستراتيجي؟ إذا كنت مشارك، ما هو دورك؟ إذا لم تشارك، لماذا؟ (مناقشة الأسباب بالتفصيل).	لاستكشاف مدى الاهتمام في مشاركة جميع المدراء في إعداد الخطة الاستراتيجية.
	ما هو تعريفك لمفهوم توافق نظم المعلومات مع التخطيط الاستراتيجي؟ وما الذي يعنيلك ذلك؟	لاستكشاف مستوى فهم هذا الموضوع
	هل إدارتكم (دائرتكم، مركزكم البحثي) تهتم وتراعي موضوع توافق نظم المعلومات مع التخطيط الاستراتيجي؟ إذا كان كذلك، ما هي العمليات التي تعزز تحقيق التوافق الاستراتيجي التي تقومون بها؟	لاستكشاف مدى تحقق وتطبيق التوافق الاستراتيجي في إدارات وأقسام المؤسسة.
	هل التوافق الاستراتيجي ناجح؟ لماذا؟ وكيف توصلت لهذه النتيجة؟	لاستكشاف الفجوة الموجودة.
	ما هي القيمة المضافة من خلال تطبيق توافق ما بين نظم المعلومات والخطط الاستراتيجية؟ (هل أضافة ميزة تنافسية، تحسين في الخرجات، عائدات مالية أفضل، خدمات أحسن، إبداع، وغيرها).	لتقييم أثر التوافق ما بين نظم المعلومات والتخطيط الاستراتيجي في المؤسسة.
	كيف تستطيع المؤسسة تحسين التوافق الاستراتيجي؟	سيساعد هذا السؤال في التوصل الى المقترحات التطويرية.
	ما هي التحديات الرئيسية التي تواجهكم في جوانب التوافق الاستراتيجي؟	التعرف على التحديات.

مجال مجموعة الأسئلة	الأسئلة	الهدف منها
الأسئلة المتعلقة بنظم المعلومات (سيتم توجيهها للعاملين بنظم المعلومات فقط، بالإضافة إلى مجموعة الأسئلة المتعلقة بالإستراتيجية)	هل تؤمن الإدارة العليا بأهمية تطوير نظم المعلومات؟ وهل تدرك دور نظم المعلومات في تحقيق الأهداف الاستراتيجية؟ ما هي طبيعة العلاقة من بين الإدارة العليا ومدراء نظم المعلومات؟	لاستكشاف مدى الثقة بأهمية عمل نظم المعلومات ونوعية العلاقة الموجودة ما بين الطرفين.
	هل تلعب تكنولوجيا المعلومات دور حيوي وأساسي في صياغة وتنفيذ أهداف المؤسسة وتحقيق نجاح الخطط الاستراتيجية بها؟ كيف؟ أو لماذا؟	تقييم دور تكنولوجيا المعلومات في تحقيق أهداف المؤسسة.
	ما هي معوقات توافق نظم المعلومات مع التخطيط الاستراتيجي؟	معرفة الصعوبات.
الأسئلة المتعلقة بالتخطيط والإدارة والجهات المساندة الأخرى (سيتم توجيهها فقط للإدارات المساندة مع مجموعة الأسئلة الإستراتيجية)	هل تدعم تكنولوجيا المعلومات المتاحه الآن وحدات الأعمال الأساسية في تحقيق أهدافها؟	لاستكشاف مدى رضا العاملين في الإدارات المساندة لأداء نظم المعلومات
	كيف تساعد تكنولوجيا المعلومات في تحقيق أهداف الخطة الاستراتيجية للمؤسسة؟ (ما هي تطبيقاتها لذلك، هل من خلال شبكات العمل الداخلية، الإنترنت، التجارة الالكترونية، وغيرها).	لاستكشاف آفاق عمل ومساهمة نظم المعلومات.

Appendix B: Consent Form for Research Participant (Arabic Version and English Version)

جامعة نورثامبريا
نموذج الموافقة

- **أوافق على أن أكون جزء من هذه الدراسة.**
- **تم تقديم شرح واستعراض لهذه الدراسة لي من قبل الباحث / أو الاستشاريين وتزويدي بورقة المعلومات، وقد قرأت وتفهمت الغرض من هذه الدراسة.**
- **أوافق أن تتم المقابلة معي.**
- **أتفهم وأشعر بالرضا بالمناقشة التي ستتم معي والتي ستسجل صوتيا وسيتم أخذ بعض الملاحظات المكتوبة في هذه المقابلة.**
- **أتفهم بأنه يحق لي سحب هذه الموافقة في أي وقت، بدون تقديم الأسباب لذلك، أو أي ضرر يترتب على ذلك.**
- **أعلم بأن إسمي والتفاصيل الوظيفية لي سيتم اخفائها والتعامل معها بسرية من قبل الباحث، ولن يتم اضهارها مكتوبة.**
- **التسجيل والمعلومات الشخصية سيتم حفظها بأمان وسرية، وسيتم الاحتفاظ بها من قبل الباحث أو الجهاز الاستشاري له حتى نهاية الدراسة، وسيتم اتلافها بعد ذلك وفقا لسياسات حفظ الوثائق بجامعة روث أمبريا.**
- **عند الحاجه، سيتم استخدام مختصر غير مسمى المصدر (لا يذكر فيه اسم المشارك في المقابلة) من هذه المقابلة لاستخدامه في تقرير هذه الدراسة.**

التوقيع من قبل المشترك في المقابلة **التاريخ**

ملاحظة: هذه النسخة فقط للترجمة، لذا يرجى استخدام النموذج الأصلي باللغة الإنجليزية لتعبئتة من قبل المشارك.

Northumbria University
CEIS Research Ethics Sub-Committee
CONSENT FORM — C

Project Title:

Name of the Researcher or Project Consultant:

Name of participant:

Participating Organisation:

I consent to take part in this project.	☐
I have had the project explained to me by the researcher/ consultants and been given an information sheet. I have read and understand the purpose of the study.	☐
I am willing to be interviewed.	☐
I understand and am happy that the discussions I will be involved in may be audio-taped and notes will be taken.	☐
I understand I can withdraw my consent at anytime, without giving a reason and without prejudice.	☐
I know that my name and details will be kept confidential and will not appear in any printed documents.	☐

- **The tapes and any personal information will be kept secure and confidential. They will be kept by the researcher/ project consultants until the end of the project. They will then be disposed of in line with Northumbria University's retention policy.**
- **Anonymised summaries (if required) will be produced from the discussions to be used in the project report and in other publications. None of the participants will be identified in the project report or in other publications based on this project. Copies of any reports or publications will be available on request to participants.**

I have been given a copy of this Consent Form
Signed: **Date:**

Researcher/Project consultant: I confirm that I have explained the project to the participant and have given adequate time to answer any questions concerning it.
Signed: **Date:**

Appendix C: Brief Research Description (Arabic Version and English Version)

جامعة نورثامبريا
كلية الحاسب الآلي والهندسة ونظم المعلومات

عنوان الدراسة:

التوافق ما بين نظم المعلومات والتخطيط الاستراتيجي (التوافق الإستراتيجي)
وأثره على نقل التكنولوجيا
دراسة حالة لمعهد الكويت للأبحاث العلمية

مختصر الدراسة:

خلال العقود القريبة الماضية، أعتبرت تكنولوجيا المعلومات المحرك الرئيسي لامتلاك أي مؤسسة للميزة التنافسة في بيئة عملها. دور تكنولوجيا المعلومات في المؤسسات تنامى بشكل ملحوظ وهائل، إضافة لذلك فإن مجالات استخدام تكنولوجيا المعلومات قد اتسعت بالتوازي (بالترادف) مع الطفرة التقنية الهائلة. لهذا، توظيف التوافق الإستراتيجي (التوافق ما بين نظم المعلومات والتخطيط الاستراتيجي) أضحى مسأل حرجه وهامة لصناع القرار في مختلف المؤسسات.

في هذه الدراسة سيتم التركيز على تناول موضوع توافق نظم المعلومات مع التخطيط الاستراتيجي في مؤسسات البحث العلمي ومراكز الأبحاث، والتي تتسم باحتوائها على عمالة عالية التعليم والمهنية والمهارة في البحث العلمي التطبيقي وتقديم الاستشارات العلمية والفنية.

تهدف هذه الدراسة لتطوير نموذج عام للتوافق الاستراتيجي والذي يمكن تحقيق التوافق في مؤسسات البحث العلمي. كما أن هذه الدراسة سوف تترجم الجوانب النظرية للتوافق الاستراتيجي لتصبح عملية وقابلة للتطبيق بشكل أكبر وذلك من خلال تطويرها لإطار عمل قابل للتطبيق وتحقيق التوافق ما بين نظم المعلومات وعمليات التخطيط الاستراتيجي.

Northumbria University
School of Computing, Engineering and Information Sciences

INFORMATION SYSTEM ALIGNMENT AND ITS IMPACT ON TECHNOLOGY TRANSFER:

THE CASE OF THE KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH

Abstract

Information Technology (IT) has been considered a key competitive driver for most organisations over the past decade**.** The role of IT in organisations is growing dramatically. Furthermore, the areas of applying IT are expanding in parallel with technological development. Therefore, implementing Information System (IS) alignment has become critical for decision makers. This research is focused on implementing IS/IT alignment in scientific research centres and organisations which employ highly educated, skilled professionals in Research and Development (R&D). The research aims to develop a generic model of IS/IT alignment, that can be applied for scientific research and R&D organisations. The research will move the strategic alignment theories forward to become more practical, by developing a framework for achieving IS alignment strategy.

Appendix D: The Flowchart of Initial Coding Tree: